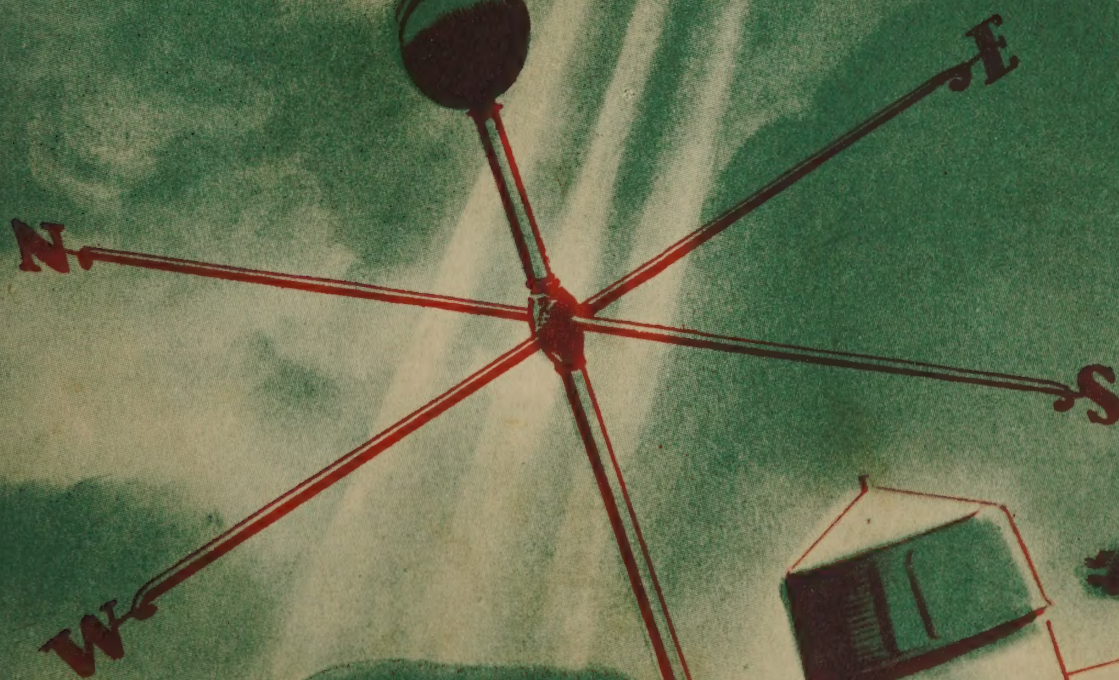


CITIES  SERVICE

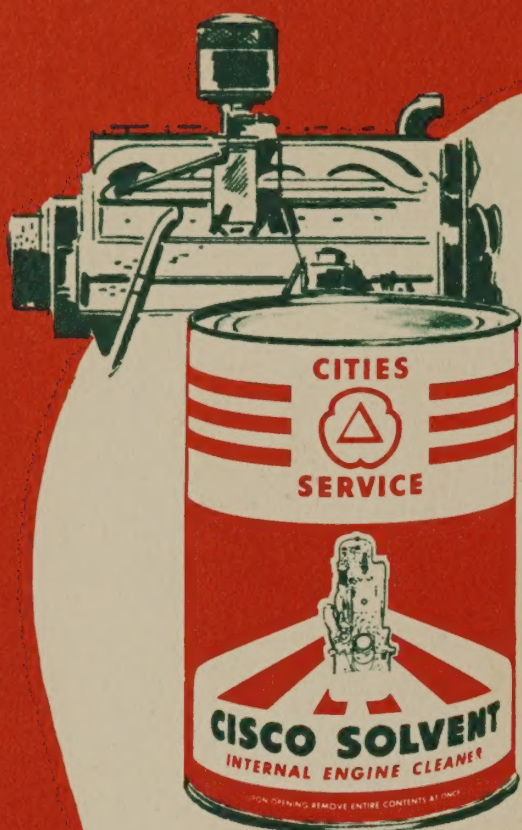
FARM

BOOK



1949





Cities Service CISCO SOLVENT is an exclusive patented product available ONLY through your Cities Service representative. Remember, too, that transmission and differential gears and bearings operate better when you keep them clean with Cisco Solvent.

Clean Engines Perform Better

Engines perform better and last longer when cleaned at regular intervals with Cisco Solvent . . . Cities Service's patented internal cleaning agent. A Cisco Solvent treatment flushes out dirt, sludge and abrasive materials that ordinary flushing oils often fail to dislodge.

It's simple to use and costs very little. Drain out used, contaminated oil; circulate Cisco Solvent through the engine for twenty minutes. Full directions on container. When you refill with fresh oil, you get safer engine lubrication, improved pep and power.

CITIES  SERVICE
CISCO SOLVENT

FREE STICKY PISTON RINGS AND VALVES WITH CISCO PEP

Are you looking for something to restore engine performance at trifling cost? Just pour a small amount of Cisco Pep into the spark plug sockets . . . it loosens gummed-up rings and valves in a hurry. Full directions on label.

A little in the gasoline tank helps prevent new formations of gum.

Try it! Cisco Pep is an overhead cylinder lubricant made to an exclusive Cities Service formula and available only through your Cities Service representative.





★ ★ ★ ★ FOREWORD ★ ★ ★ ★

There has never been a famine in this land of ours. There have been years when crops were not good. There have been dry spells and early frosts, plagues of plant-devouring insects, and the scourge of plant disease. At such times many an industrious farmer has seen his long weeks of labor come to a tragic end, a harvest insufficient to buy his next year's seed.

Never, however, has our nation had to go hungry—not since the days when the Pilgrim Fathers tightened their broad belts and shared their few kernels of corn through their first New England winter. Usually we have had more than enough. We share, but now it is out of our bounty to relieve the hungry millions elsewhere in the world.

America is proud of many achievements. It leads the world in industry and transportation, in the development of natural resources, in its educational system, and in its unrelenting crusades against cancer and other ills which beset mankind, but before it could lead in any of these things, it had first to establish leadership in agriculture. The record shows how well this has been done—close to six million farms, more than a billion farm acres, 350 million of them crop lands; a farm investment of nearly 50 billion dollars, and a 1948 harvest abundant for all current needs and for stockpiling, too.

Old ways could not have accomplished this. The American farmer has kept

pace with progress. He has adopted modern methods and obtained the facilities to implement them. Manufacturing gave him more powerful and economical machines, and petroleum provided the fuels and lubricants to operate these machines efficiently. Science developed new weapons for his war against insects and plant disease, and new aids to multiply the fruits of his fields. Many of these are the products of petroleum.

From asphalt roads to preserving-waxes and refrigerants, the petroleum industry has been enabled in countless ways to assist in this mighty task of producing from the land. In large part because of these petroleum contributions, the output per farm worker now nearly doubles that of forty years ago, and the job is being done with less wear and tear on the laborer.

The relationship between agriculture and petroleum has been one of mutual benefit. It is from farm lands principally that the petroleum industry produces its oil. It is through farm lands mainly that its pipelines run. When finally the finished products are ready for the market, the farm ranks among the best of petroleum's customers. Clearly, such an alliance, so vital to the well-being of the nation as a whole, should be diligently promoted.

It is with that thought in mind that Cities Service has caused this volume to be prepared and published for the farmers of America.

Cities Service Oil Company



Arkansas Fuel Oil Company

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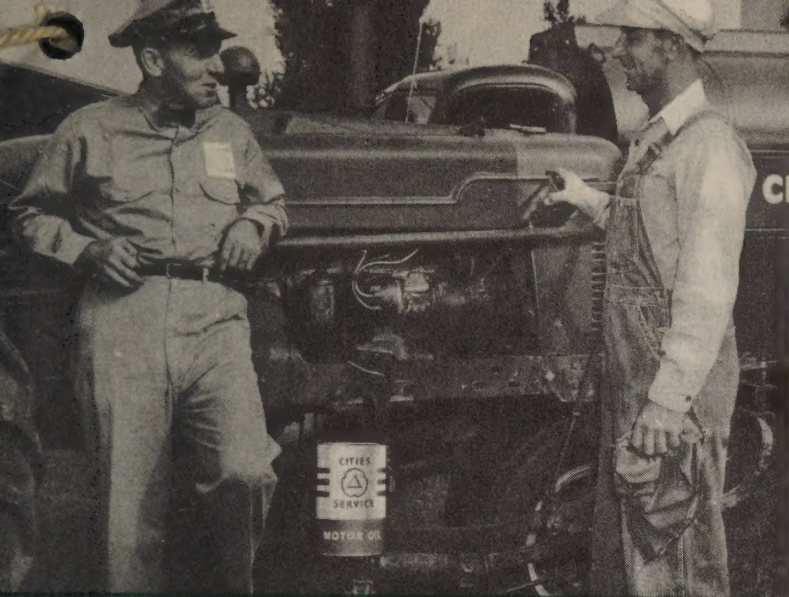
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Safeguard your investment in farm machinery with frequent and proper lubrication. Use only quality lubricants.



You're on the right track when you use Cities Service farm-tested lubricants such as Trojan Grease.



Timeliness of lubrication is important in farm machines that are subject to flying dust particles.

Farm

Machinery



PROTECTION AGAINST WEAR

Failure to lubricate properly and often enough are the principal causes of breakdowns and shorten useful life of farm machinery, according to authorities.

To safeguard your investment, frequent and proper lubrication is the best protection you can give your machinery. Always follow recommendations for lubrication given in owner's or instruction manual. When in doubt as to the type and grade of lubricant to use, follow the advice of your Cities Service representative or your farm equipment dealer.

Use a systematic manner of lubrication so that no oil hole or grease fitting is overlooked.

The No. 1 rule for effective lubrication is "Keep It Clean." Proper storage of oil and grease to keep them free from grit and dirt is important. Dirt mixed with oil and grease acts as an abrasive instead of a lubricant.

Always use clean containers and keep them covered when not in use. When lubricating pressure fittings, wipe them clean before using the pressure gun. Wipe off grease cups before refilling. If the grease in the cup is caked, take the time to clean the cup and bearing before refilling. Make sure the grease cups are turned down frequently (a half turn at a time) to force grease into the bearing.

When oiling must be accomplished through oil holes, use a little oil sparingly several times a day. Be sure there is no dirt around the oil holes. In many cases it is wise to install pressure gun fittings as a substitute for grease cups or oil holes. Both the drive-in and threaded type fittings are easily obtainable in a number of sizes. The installation of pressure gun fittings is especially recommended for all fast-moving shafts and parts that require frequent, dependable lubrication.

LUBRICATION AND CARE OF BEARINGS, CHAINS AND SPROCKETS

Bearings, chains and sprockets are key parts on most farm implements. The information given here covers lubrication and maintenance points that will help give you more trouble-free service from these parts.

BEARINGS With pressure-type grease fittings and screw-type grease cups, bearings should be lubricated until the new grease appears at the side of the bearings unless they are of the sealed type.

The grease should not be forced out of the sides on sealed-type bearings as this extra pressure can break the seals and allow dirt to enter. Keep open-end bearings well filled with grease to eject or prevent dirt and grit from entering.

If you use an oil can to lubricate bearings, do it frequently enough to keep the oil steadily working outwards. In addition to lubricating the bearing surfaces the new oil acts as a cleansing agent by expelling dirt and grit.

Some of your implement bearings may have cups containing wick or filter-type fillers of wool waste. Clean these fillers once a season with kerosene and refill with fresh oil. If necessary replace these fillers. Cotton waste should not be used as it mats down and is subject to chemical action.

When making your regular season-end check-up, carefully inspect those bearings which have been subjected to dirt, dust, chaff, etc. Those that can be opened should be flushed with kerosene and re-lubricated. Bearings on disk harrows, disk plows, rolling colters and other parts operating close to the soil should be given special attention. Automotive-type bearings such as used in tractors and other heavy-duty equipment usually require no special attention other than regular lubrication, except in case of failure or when equipment is being overhauled in the shop.

CHAINS AND SPROCKETS If chains do not operate in grit or sand, they should be lubricated frequently with light-bodied oil. By running the chain slowly and using a brush to get into all the joints you will get thorough penetration of the oil. Apply the lubricant on the inside of closed or roller chains and on the outside of open-type chains.

If chains do operate in grit, sand or dust, they should be removed and thoroughly cleaned before lubricating them. To clean, remove the chain and soak and rinse in kerosene. After drying, dip them in a light-bodied oil. Be sure to wipe off excess oil before putting them back on the implement.

When you store them at season end, apply Cities Service Anti-Corrode and label them. Clean them again before putting back into operation and treat with oil as previously described. Chains usually are placed on the sprockets with the slot side out and with the hooks facing forward to run in the direction of chain travel.

KOOLMOTOR GASOLENE

Cars and trucks get easy starting, more miles per gallon, give downright satisfaction with Koolmotor. Try it. Make a habit of using it. It's adjusted to the local conditions of climate in your area. Just ask for Koolmotor Gasolene.

CITIES SERVICE DIESEL FUEL OIL

If you have a diesel-powered tractor, put it on a steady diet of Cities Service Diesel Fuel Oil and watch the difference. No matter what conditions you operate under, you'll be satisfied with this scientifically balanced fuel with its easy starting properties and dependable performance.

HELPFUL TIPS ON FARM TILLAGE TOOLS

The facts on this page are those which agricultural engineers say are most likely to be overlooked by the operators.

CORN PLANTERS: Seed corn must be graded carefully as no planter can handle kernels of varying sizes and drop an accurate number in each hill. Seed varies from year to year, even in the same strain, so that the seed plates must always be tested and the proper sized opening found before going to the field.

Check Accuracy

To check the accuracy of the planter, set it in some convenient place and put a block under the frame so that the drive wheel can be turned. Two men should be available, one to turn the wheel and one to check the number of kernels dropped in each hill, checking one side at a time.

Cracking of seed is usually due to putting the plates in wrong, or in some cases to the plate holder being upside down. Be sure you have installed the plates properly.

Accuracy of planting cannot be expected if the action of the clutch is not quick and positive. Accumulative drop planters have clutches which sometimes become gummed up or worn. The clutch should be cleaned with kerosene, and inspected for worn parts which must be replaced.

DRAG OR SPIKE-TOOTH HARROWS: Do *not* leave your spike-tooth harrow standing in the field for months with the teeth partly buried in the soil. Such treatment causes the machine to rust and weaken, making repair difficult. It also impairs the efficiency of its work as the rusty parts do not scour properly in the field. Keep the frame, levers and draft attachments tight and properly adjusted.

The harrow should be stored in a dry place and protected against rust with an effective anti-rust medium. Set it up on edge on boards, or if it is laid down flat be sure that the teeth do not sink into the ground. If you do not have runners to transport the harrow section, put it on a drag or wagon when moving it over pavement or stony ground. This will prevent breaking or dulling the teeth.

DISK HARROWS: The bearings in a disk harrow work in the dirt most of the time and require frequent attention. Wash them out once a year with kerosene and repack with oil before assembling them.

When greasing, be sure you get thorough lubrication and cleaning by screwing the cups down until the grease is forced out of the edges of the bearing.

Get the most out of your disk harrow by having the blades sharp. Be sure to keep the original angle at the edge of the disk when sharpening.

Adjust scrapers properly so that disk blades are kept clean. However, don't set too close as it will cause friction and wear.

See that snubbing irons are adjusted either up or down to keep the sections cutting at the same depth at both ends. Improper adjustment may increase the draft.

When allowing the disk to lap over on previously disked ground, the part of the disk working this portion should be set at a slightly greater angle to make the disk pull straight ahead.

In storing, see that the disk is run up on boards to prevent its sinking into the ground. Remove dirt from disk blades and apply Cities Service Anti-Corrode.

GRAIN DRILLS: If the drill is not calibrated for the seed you wish to use, it can easily be done as follows: Measure the diameter of the wheel; multiply this by 3.1416, which gives the distance the wheel travels in one revolution; or measure the circumference of the wheel direct.

If the wheel travels 15 feet in one revolution and the drill sows a strip of 8 feet, multiply 8 by 15, which equals 120 square feet. An acre has 43,560 square feet; dividing this by 120 gives 363 revolutions of the drive wheels necessary to sow an acre.

To get the amount of seed sown, either fill the hopper and measure the amount of seed the drill drops in 363 revolutions, or put in a known amount of grain and count the revolutions of the wheel necessary to run it all out.

By adjusting the "quantity of seed sown" lever and making a few trials, the exact amount to be sown per acre can readily be determined.

SAFEGUARD AGAINST RUST

It will pay you to protect your machinery *on the outside* against rust—just as it pays you to lubricate for protection *on the inside* against wear.

Your Cities Service representative can provide you with a “1-2 punch” that will enable you to win out in your battle with rust. It consists of two products—Cities Service Rust Remover and Cities Service Anti-Corrodes.

If your machinery has already been attacked by rust, you can remove it easily with Cities Service Rust Remover. It may be applied with a stiff brush or cloth, or small articles may be immersed in it. The action of Rust Remover is quick and thorough. It can be used effectively on chromium, copper, aluminum, steel and iron. It is odorless and non-inflammable. If not removed before repainting, rust will spread under a newly painted surface and soon destroy it. Protect your machinery from rust by using Cities Service Rust Remover before painting steel or iron surfaces.

Cities Service Anti-Corrodes 100 or 107-A are especially valuable to farmers

because they form a “poresealing” coating that protects machined surfaces from rust. These coatings last for months and are easy to apply. Their impenetrable film seals out air and moisture, and offers long lasting protection even when the machinery is left outdoors.

Anti-Corrode 100 or 107-A may be sprayed on machinery or painted on with a brush. Bright metal surfaces properly treated with a Cities Service Anti-Corrode in the fall, will be completely protected till spring.

Your Cities Service representative will supply you with Rust Remover and recommend the Anti-Corrode best suited for your use.

Guard Against Weather

To lengthen machinery life, it is a good practice to keep all wooden and non-operating parts painted. It adds to the appearance of the equipment; gives you and your help extra pride in using it. What's more they'll give new looking equipment better care. It pays to take time to sand off all old paint enough to smooth the surface before repainting. You'll profit by making machinery repainting part of your check-up at the season's end. By following the rust-preventive measures described here you'll save time and money in the spring when you're ready to start the new season in the fields.



Your BEST Safeguard Against Rust . . .

CITIES SERVICE RUST REMOVER and ANTI-CORRODE

If rust gets the jump on you, don't give up. You can remove it easily in a matter of minutes with Cities Service Rust Remover. It's a fast worker . . . easy to use. Non-inflammable and inexpensive. Safe for use on practically all metal, enamel or porcelain surfaces. Keep a supply on hand.

Rust can't get through Cities Service Anti-Corrodes to ruin tools and implements. Coat all bright surfaces on idle machinery with either Anti-Corrode 100 or 107A. It forms a durable weather-resistant film over the surface and one coating lasts for months. Easily removed with kerosene.



The cardinal rule of proper machinery maintenance is to lubricate regularly using only high quality oils and greases.

MAINTENANCE OF TRUCK and TRACTOR ENGINES

Intelligent year-round care of truck and tractor engines will prevent most of the troubles an operator encounters. There are many ways to cut down on costly repairs.

One way is to adopt the cardinal rule that professional mechanics use. This rule is to use only high quality oils, greases and fuels right from the time you purchase your new truck and tractor. Your Cities Service representative can help you determine the right type and grade of these products to use for your own particular model truck or tractor. When you buy these products in large quantities and store them on your farm, be sure they are kept in clean, tightly-sealed containers.

Carburetors may be the source of considerable engine trouble in both trucks and tractors. They must be properly adjusted for the season and the fuel you are using. The choke should work freely. It should open up completely in order to prevent excessive fuel consumption. Carburetor and manifold gaskets should be leak-proof.

Your truck and tractor engines will give better service longer if you accelerate them slowly and gradually. Too rapid acceleration exposes moving parts to unnecessary strain.

Poor compression in truck and tractor engines may be caused by scored piston, worn, broken or stuck piston rings, or leaky cylinder head gasket. More likely it will be caused by poorly seated valves

Trucks and Tractors



or improperly adjusted valve tappets. You can check the compression by cranking the engine slowly and noting the pull required for each cylinder.

If a tractor operates 700 hours or more a year, the cylinder head should be removed so the carbon can be scraped off and the valves inspected. It is not good practice to use a cylinder-head gasket a second time. Soak the new gasket in water for at least 10 minutes and apply some grease to both surfaces before assembling the engine.

Valve Wear on Truck and Tractor Engines

If valve faces are badly pitted and cannot be reconditioned by grinding, or if grooves are worn in the valve faces, reface them in a valve refacing machine. The edge of the valve should be blunt. If in refacing it becomes sharp, the valve must be replaced with a new one. A sharp edge burns rapidly and destroys the fit of the valve. If new rings are not installed when the valves are ground, the engine may pump oil.

Grinding valves is a difficult job and requires time and patience. Many truck and tractor owners feel that this is a job best done by their truck or implement dealers whose special equipment such as refacers, reamers and seat gauges enable them to do a perfect job.

If the valve seat is in such bad condition that it cannot be restored by grinding, it can be refaced with reamers. If reaming leaves the seat too wide, it must be reamed down on top and off at the bottom. Usually this reaming should be done by an expert mechanic.

A better method of repairing the exhaust-valve seat is to have a qualified machine shop put in new alloy valve-seat inserts. These inserts do not pit or burn readily.

Pistons and Connecting Rods

Pistons and connecting rods of tractors should be removed, and inspected every

MAINTENANCE OF TRUCK and TRACTOR ENGINES

700 to 1,200 hours. Remove piston rings and free them and their grooves from "carbon" that often accumulates in the ring zone and causes them to stick. If rings and grooves are worn, replace. Take up any serious play in the connecting rod bearing and piston pin.

Cylinders may become worn from improper lubrication, high spots on cylinder wall, or piston, or by corrosive compounds formed either in the combustion chamber or crankcase. Also by abrasives reaching the crankcase through the breather or the combustion chamber through the air intake. Check with your Cities Service representative to see that you are using the proper grade and type of oil and fuel.

In engines equipped with replaceable cylinder sleeves, cylinder wear can be easily corrected by putting in new sleeves.

Wear in the piston pin bushing will show up in the form of a tapping sound while the motor is running or by looseness when the piston and rod assembly are removed and inspected. This looseness can be corrected by putting in a new piston pin and bushing or an oversized piston pin. Usually the first method is employed. This replacement is difficult to make on the farm because of the accuracy of the workmanship required. It usually should be done in a machine shop by experienced mechanics. The cost is small compared with the satisfactory service resulting from such work.

When the piston pin and bushing or bushings are assembled, the piston *must* be aligned correctly with the connecting rod or it will bind in the cylinder and cause excessive drag and wear. *Aligning must be done in a machine shop.* Always make sure the piston pin is safely secured against working endwise and scoring the cylinder.

Connecting-rod bearings require very little adjusting if the truck or tractor operator has been careful to use *good oil* and to keep it in good condition by periodic drainings.

Many late tractors are equipped with the new inexpensive precision-type, steel-backed, babbitt-lined crankshaft and connecting-rod bearings. These bearings are machined to fit the crankshaft without scraping and have no shims for adjusting. Electric hardening practically does

away with crankshaft wear, and any wear that does occur is usually in the connecting-rod bearing. Bearing wear is taken up by installing new bearings.

Main bearings in tractors should be checked for end-play and up-and-down play each 700 to 1,200 hours of use. Although these bearings seldom give trouble, they gradually wear, chiefly because of poor lubricating oil, thin oil, and the accumulation of dirt and grit in the crankcase.

If there is too much end-play, it is usually due to wearing off of the thrust flange on the main bearing or bearings. A new bearing may need to be installed. It may be advisable to secure expert advice on this problem. Some bearings are installed without scraping, but if scraping is necessary it should be done by a competent mechanic. Be sure that the nuts holding the main bearings are securely fastened.

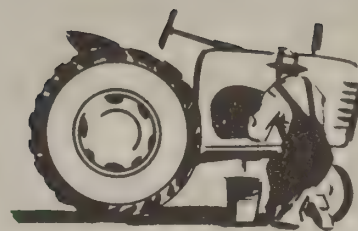
Crankshafts sometimes are pounded out of round at the crankpin bearings by the action of the connecting rods. When the crank-throw bearing is so much out of round that the connecting rods cannot be kept tight, the crankshaft must be machined round or exchanged for a reconditioned shaft. Some tractor companies exchange crankshafts and supply new bearings at a very low cost.

Oil pumps in tractors are usually of the gear type and require little care. Inspect the pump when the oil pan is off, however, so as to detect excessive wear, which will reduce the oil pressure. Wear may take place between the gear teeth and the outside of the housing, or the gears may wear a recess in the lower plate which holds them in place, allowing them to drop lower.

Tractor Oil pans collect quantities of dirt, grit, and sludge, and need to be removed and washed every 700 to 1,200 hours. The inside of the engine should be washed with gasoline. When replacing the pan, be sure the gasket is in good condition or loss of oil may result.

Oil screens should be cleaned after each 700 to 1,200 hours of use, or more often if they are easily removed. Watch to see that all corners of the oil screen are soldered or sealed, and that there are no holes to let larger particles of material into the oil pump to be circulated through the motor. These large particles often stop up some of the oil holes and cause bearings to burn out.

Getting Tractor Ready For Use After Storage



1. Fill the radiator and fuel tank.
2. Add Cisco Pep to the gasoline—it will help in the job of freeing valves and rings.
3. Drain used oil from the crankcase; replace drain plug and pour Cisco Solvent into crankcase. Allow engine to run at fast idle for 20 minutes. Stop engine and remove drain plug, allowing crankcase to drain thoroughly. Replace plug and fill clean crankcase with fresh oil to proper level.
4. After engine cools, remove spark plugs and pour about $\frac{1}{4}$ cup of light

engine oil into each cylinder. Turn the engine over by hand (with crank) about 20 to 30 times before replacing spark plugs. This will distribute the oil over the cylinder walls, pistons and piston rings.

5. While the spark plugs are out, re-gap and clean them. Then put them back in place.

6. Check all vital chassis points to see that each has the proper type and grade of lubricant.

7. Always warm up engine by allowing it to idle slowly for five or ten minutes before driving the tractor.



NINE HELPFUL TIPS ON TRACTOR STORAGE

When putting your tractor up for the Winter, it pays to take a little extra time to make sure that it is properly protected. These nine important points will help to assure proper protection for your tractor during Winter storage.

1. Clean any dirt or mud from the tractor, and wipe down with gasoline or kerosene. Be careful to keep oily liquids away from rubber tires.
2. Place rubber-tired tractors on blocks to take the weight off the tires. Keep in a dry place.
3. Change the motor oil, making sure that the engine is run for several minutes afterwards to circulate the fresh oil.

Leave Drains Open

4. Drain the radiator, fuel tank and carburetor, leaving the drains open.
5. Lubricate all chassis bearings with Cities Service Trojan Grease of the proper type and grade.
6. Stuff rags in the exhaust and air intake pipes to keep moisture from valves and cylinders.
7. Remove the spark plugs and pour about a $\frac{1}{4}$ cup of fresh crankcase oil into each cylinder—then turn the engine over by hand several times to distribute the oil. Replace the spark plugs.

8. If water is used in the tires for added weight, be sure that calcium chloride or other proper anti-freeze is added and thoroughly mixed with the water.

9. Remove the battery, and keep it charged while not in use.

CITIES SERVICE

Radiator Seal

Stop those small radiator leaks yourself at little expense with **Cities Service Radiator Seal**. It does not affect hose connections or thermostats... mixes easily with any standard anti-freeze... does not clog.

CITIES SERVICE

RADIATOR SEAL

TRACTOR TROUBLE- SHOOTING CHART

After long use, rust and scale collect in the cooling system . . . often cause overheating and damage to the engine. All you need to do to prevent rust and scale formation is use Cities Service Radiator Cleaner. Does the job in a jiffy . . . and costs very little. Try it and see what a lot of rust and scale you drain out. Harmless to all water-cooled engines.

CITIES  SERVICE

RADIATOR CLEANER

IF THIS HAPPENS	LOOK FOR THESE CAUSES OF TROUBLE
ENGINE WON'T START	No fuel—Fuel pump defective—Clogged strainers—Choke not working or engine “flooded”—Faulty timing—Spark plugs wet, fouled, cracked or improperly “gapped”—Distributor or magneto wet—Breaker points fouled, burned or improperly adjusted—Defective coil or condenser. Gears engaged or brakes set—Weak battery—Loose wiring connections—Defective starting motor—Crankcase oil too heavy (in winter)—Frozen water pump—Stuck pistons—Frost in one or more combustion chambers (in winter).
ENGINE “MISSES”	Ignition wires loose, broken, corroded—Plugs wet, dirty, cracked, mis-gapped—Carburetor misadjusted; choke not working—Diesel injection pump or nozzle faulty; leaks—Manifold heat control improperly set—Valves stuck, leaking, burned; incorrect clearance—Defective coil or condenser—Leaky gaskets (intake manifold or cylinder head).
ENGINE OVERHEATS	Brakes set or dragging—Excessive load or speed—Water low—Loose fan belt—Frozen or clogged radiator—Carbureted mixture too lean or too rich—Thermostat stuck; water pump not working—Incorrect timing—Manifold heat control improperly set—Retarded spark.
TRACTOR LACKS POWER	Brakes set; dragging—Poor compression; leaky valves; worn or stuck rings—Air cleaner clogged—Carbureted mixture too rich or lean; Choke stuck—Incorrect timing—Fuel filters dirty; Injection trouble; (Diesel)—Pulling too much load—Engine overheated or “missing”—(See above).
ENGINE KNOCKS	Engine overheated (above)—Engine oil low—Carburetor too lean—Excessive carbon—Incorrect fuel—Sticking valves—Incorrect timing—Worn bearings—Wrong fuel—Dirty combustion chambers.
SMOKE FROM EXHAUST	Overloading—Carburetor or choke incorrectly adjusted—Improper fuel—Piston ring trouble—Diesel fuel injection timing late; leaking—Loose bearings or worn valve guides—Over-lubrication; excess oil—Engine missing—(above).
USING TOO MUCH OIL	High engine speed—Ring trouble—Loose bearings; Wrong grade of oil—Oil badly diluted—Oil level too high—Excessive idling—Leaks (lines, gaskets, bearings)—valve guides.
USING TOO MUCH FUEL	Excessive idling—Long operation in lower gears—Overloading; poor traction—Incorrect carburetor setting; choke stuck—Diesel injector faulty—Engine mis-fires (see section above)—Dirty air cleaner—Fuel leaks; engine overheats (above)—High engine speeds.
ENGINE STALLS (in summer) AND FAILS TO START	May be due to “vapor lock” in fuel system. Allow engine to cool then try starting it again. If it now fails to start look under “Engine Won’t Start” for other causes.



This farmer has found that use of quality Cities Service products has helped him to get the most out of his farm machinery.

Proper lubrication is the most important item in tractor care. On it depends the life of the engine as well as its efficient working. Neglect causes serious trouble, excessive wear, and sometimes complete breakdown—which, of course, means loss of money and valuable time.

For your own protection use only high-grade oil and greases on your farm

Lubrication



cating so not a single oil hole or grease fitting is neglected.

Enclosed gear cases in most of your equipment have a proper oil level that must be maintained when machinery is in use. Make sure that you use oil of proper type and viscosity for the season. When changing the transmission and differential lubricant, take the time to remove all sludge, grit and tiny metal particles that adhere to the gears. If new oil is added before these foreign materials are removed, the new oil will become contaminated and the sludge and abrasives will cause extra wear. The use of Cities Service Cisco Solvent does the gear cleaning job quickly and with little effort.

Effective Lubrication Means Longer, More Efficient Machinery Life

machinery. When you are in doubt as to the proper type or grade lubricant to use, consult your Cities Service representative. He will appreciate the opportunity to be of service to you.

Always follow recommendations for lubrication given in owner's or instruction manual. If these manuals are not available for each of your various machines, play it safe by lubricating often enough to keep parts from running "dry" or heating up. Tests made by various Agricultural Experiment Stations show that failure to lubricate tractors and farm machinery as often as recommended by the manufacturers is the major cause for failure of the equipment.

Use Check-Off System

Make it a point to know the location of all oil holes and grease fittings on each piece of machinery that you lubricate yourself. Don't trust to your memory. Use a check-off system of lubri-

When you install fresh Cities Service Oils in your tractor engine, you are giving protection to bearings, rings, piston and cylinder walls. In reality, you are installing tiny "ball bearings" of oil which must be tough enough to keep moving parts from rubbing together. You can't tell by looking at oil whether or not it is ready to be changed. So ask the Cities Service representative for recommendations of the proper type for the service.

Use Finest Quality Oil

Oil is inexpensive compared with the cost of replacement parts. Manufacturers recommend using the finest quality engine oil. (Your Cities Service representative can supply you with top quality Cities Service Oil—none finer!)

You can check the oil level most accurately in the morning before starting the engine—and again after the engine has stood idle during the lunch hour, after the oil has had a chance to drain back into the crankcase.

Tractor Engine Lubrication Chart

MAKE AND MODEL	CRANKCASE					TRANS. AND DIFF.			FINAL DRIVE		
	Capacity	Above 90°F.	Lowest Anticipated Temperature			Capacity	Above +32°F.	Below +32°F.	Capacity Each Unit	Above +32°F.	Below +32°F.
			+32°F.	+10°F.	-10°F.						
	Qt.	SAE	SAE	SAE	SAE	Pt. or Lb.	SAE	SAE	Pt. or Lb.	SAE	SAE
ALLIS-CHALMERS—											
Wheel Type—											
B, C.....	4	30	20,20W	20W	10W	12 ¹	20W	20W	1½	140	90
RC.....	4	30	20,20W	20W	10W	20 ²	140	90	1	250	140
U.....	10	40	30	20W	10W	96	140	90	—	—	—
UC.....	10	40	30	20W	10W	96	140	90	4	140	90
WC.....	6	40	30	20W	10W	20 ²	140	90	1	250	140
Crawler Type—Gasolene Engine—											
K, WK.....	14	40	30	20W	10W	44	50	30	14	50	30
L, LL.....	24	40	30	20W	10W	80	50	30	16	50	30
M, WM.....	10	40	30	20W	10W	24	50	30	10	50	30
S, WS.....	20	30	20,20W	20W	10W	46	50	30	16	50	30
Crawler Type—Oil Engine—											
KO, WKO.....	16	30	20,20W	20W	10W	44	50	30	14	50	30
LO, LLO.....	26	30	20,20W	20W	10W	80	50	30	16	50	30
SO, WSO.....	20	30	20,20W	20W	10W	46	50	30	16	50	30
Crawler Type—Diesel Engine—											
HD-7.....	11	30GP	30GP	20GP	10GP	52	50	30	14	50	30
HD-10.....	13	30GP	30GP	20GP	10GP	48	50	30	16	50	30
HD-14.....	14	30GP	30GP	20GP	10GP	80	50	30	16	50	30
B. F. AVERY—											
A.....	5	30	30	20W	10W	20 ³	60	30	3	60	30
GG (Cletrac).....	5	30	30	20W	10W	20 ³	4	4	3	4	4
V.....	3	30	30	20W	10W	5 ⁵	4	4	3	4	4
J. I. CASE—											
C (Early).....	7 ⁶	30	20,20W	20W	10W	72	140	90	—	—	—
C (Late), CC.....	7 ⁶	30	20,20W	20W	10W	84	140	90	—	—	—
D, DC, DCS, DO.....	7 ⁶	30	20,20W	20W	10W	80	140	90	—	—	—
L, LA.....	12 ⁶	30	20,20W	20W	10W	136	140	90	—	—	—
R, RC, S, SC, SO.....	5 ⁶	30	20,20W	20W	10W	72	140	90	—	—	—
V, VC, VO.....	4 ⁶	30	20,20W	20W	10W	40	140	90	—	—	—
VA, VAC, VAO.....	4 ⁶	30	20,20W	20W	10W	56	140	90	—	—	—
VAH.....	4 ⁶	30	20,20W	20W	10W	36	140	90	3	140	90
"CATERPILLAR"—											
Diesel Engine—											
D2 (Series 4U1, 5U1).....	15	30GP	30GP	10GP	10GP ⁸	16	90 ⁹	80 ⁹	8	90 ⁹	80 ⁹
D4 (Series 6U1, 7U1).....	17	30GP	30GP	10GP	10GP ⁸	40	90 ⁹	80 ⁹	14	90 ⁹	80 ⁹
D2, Early Models (Series 3J1, 5J1).....	13	30GP	30GP	10GP	10GP ⁸	16	90 ⁹	80 ⁹	8	90 ⁹	80 ⁹
D4, Early Models (Series 4G1, 7J1, 2T1, 5T1).....	16	30GP	30GP	10GP	10GP ⁸	40	90 ⁹	80 ⁹	14	90 ⁹	80 ⁹
D6 (Series 8U1, 9U1).....	19	30GP	30GP	10GP	10GP ⁸	72	90 ⁹	80 ⁹	22	90 ⁹	80 ⁹
D7 (Series 7M1, 3T1).....	22	30GP	30GP	10GP	10GP ⁸	80	90 ⁹	80 ⁹	44	90 ⁹	80 ⁹
D8, Prior to Series 1H6852.....	27	30GP	30GP	10GP	10GP ⁸	80	90 ⁹	80 ⁹	52	90 ⁹	80 ⁹
D8, After Series 1H6852.....	29	30GP	30GP	10GP	10GP ⁸	80	90 ⁹	80 ⁹	52	90 ⁹	80 ⁹
D8, Late Models.....	34	30GP	30GP	10GP	10GP ⁸	80	90 ⁹	80 ⁹	52	90 ⁹	80 ⁹
Gasolene Engine—											
R2.....	12	30	20,20W	10	10	16	90 ⁹	80 ⁹	8	90 ⁹	80 ⁹
R4.....	13 ¹⁰	30	20,20W	10	10	40	90 ⁹	80 ⁹	14	90 ⁹	80 ⁹
JOHN DEERE—											
A, AN, ANH, AW, AWH (Prior to 1947).....	9,8	50	40,30	20W	10W	64	140	90	—	—	—
A, AN, AW (1947 and after).....	10	30	20,20W	10W	10W	54	140	90	—	—	—
AO, AR.....	9	50	40,30	20W	10W	64	140	90	—	—	—
B, BN, BNH, BW, BWH (Prior to 1947).....	7,7½	50	40,30	20W	10W	36	140	90	—	—	—
B, BN, BW (1947 and after).....	6	30	20,20W	10W	10W	36	140	90	—	—	—
BO, BR.....	7	50	40,30	20W	10W	40,36	140	90	—	—	—
D.....	13	50	40,30	20W	10W	56 ¹¹	140	90	—	—	—
G, GN, GW (Prior to 1947).....	11	50	40,30	20W	10W	72	140	90	—	—	—
G, GN, GW (1947 and after).....	10	50	40,30	20W	10W	56	140	90	—	—	—
GM.....	11	50	40,30	20W	10W	56	140	90	—	—	—
H, HN, HNH, HWH.....	4½	50	40,30	20W	10W	24	140	90	—	—	—
L.....	2	30	30	10W	10W	3½	90	90 ¹²	1½	90	90 ¹²
L (Late Models), LA.....	3	30	30	10W	10W	3½	90	90 ¹²	1½	90	90 ¹²
M (1947 and after).....	4	30	30	10W	10W	13	90	90 ¹³	3	90	90 ¹⁴
FORD—											
Models 9N, 2N (1939-1947).....	6	30	20,20W	20W	10W	40	90	80	—	—	—
Model 8N (1947-48).....	6	30	20,20W	20W	10W	40	90	80	—	—	—

10, 10W	Trojan or Koolmotor Motor Oil 10 or 10W	80	Trojan or Koolmotor Gear Oil SAE 80
20, 20W	Trojan or Koolmotor Motor Oil 20 or 20W	90	Trojan or Koolmotor Gear Oil SAE 90
30	Trojan or Koolmotor Motor Oil SAE 30	140	Trojan or Koolmotor Gear Oil SAE 140
40	Trojan or Koolmotor Motor Oil SAE 40	250	Trojan or Koolmotor Gear Oil SAE 250
50	Koolmotor Motor Oil SAE 50	10GP	Cities Service GP Motor Oil SAE 10 ³¹
60	Koolmotor Motor Oil SAE 60	20GP	Cities Service GP Motor Oil SAE 20 ³¹
70	Koolmotor Motor Oil SAE 70	30GP	Cities Service GP Motor Oil SAE 30 ³¹

MAKE AND MODEL	CRANKCASE					TRANS. AND DIFF.			FINAL DRIVE		
	Capacity	Above 90°F.	Lowest Anticipated Temperature			Capacity	Above +32°F.	Below +32°F.	Capacity Each Unit	Above +32°F.	Below +32°F.
			+32°F.	+10°F.	-10°F.						
	Qt.	SAE	SAE	SAE	SAE	Pt. or Lb.	SAE	SAE	Pt. or Lb.	SAE	SAE
FERGUSON—											
TO-20, TE-20	6	30	20,20W ³³	20,20W	10,10W	40	90	80	—	—	—
INTERNATIONAL—											
Gasolene Engine—											
T-6	9	30	20,20W	20W	10W	32	90	90 ¹⁵	2	90	90 ¹⁵
T-9	11	30	20,20W	20W	10W	44	90	90 ¹⁵	3	90	90 ¹⁵
Diesel Engine—											
TD-6	9	30GP	20GP	10GP ¹⁶	10GP ¹⁶	32	90	90 ¹⁵	2	90	90 ¹⁵
TD-9	11	30GP	20GP	10GP ¹⁶	10GP ¹⁶	44	90	90 ¹⁵	3	90	90 ¹⁵
TD-14	16	30GP	20GP	10GP	10GP	48	90	90 ¹⁷	6	90	90 ¹⁷
TD-18 (After Sept., 1947)	26	30GP	20GP	10GP	10GP	60	90	90 ¹⁸	10	90	90 ¹⁸
TD-18 (Early Models)	22	30GP	20GP	10GP	10GP	60	90	90 ¹⁸	10	90	90 ¹⁸
MASSEY-HARRIS—											
20, 22, 81, Gasolene 20K, 22K, 82, Distillate	4	30	20,20W	10,10W	10W	19	140	90	—	—	—
101, 102 RC, S (Junior)	4	30	20,20W	20,20W	10	48	140	90	—	—	—
101 RC, S (Senior, Super)	5	30	20,20W	20,20W	10	48	140	90	—	—	—
102 RC, S (Senior Super)	6	30	20,20W	20,20W	10	48	140	90	—	—	—
30 Gasolene, 30K Distillate	4	30	20,20W	20,20W	10	104	140	90	—	—	—
44 Gasolene, 44K Distillate (Standard)	8	40	30	20,20W	10	104	140	90	—	—	—
44 Gasolene, 44K Distillate (Row Crop)	8	40	30	20,20W	10	104	140	90	—	—	—
44-6 Gasolene (Row Crop)	5	30	30	20,20W	10	104	140	90	—	—	—
44-6 Gasolene (Standard)	5	30	30	20,20W	10	104	140	90	—	—	—
55 Gasolene, 55K Distillate	11,10	40	30	20,20W	10	141	140	90	—	—	—
MCCORMICK-DEERING—											
Farmall A, AV, B, BN	5	30	30	20W	10W	10	90	90 ²⁰	3	90	90 ²⁰
Farmall F-12, F-14	5½	40	30	20W	10W	32	140	90	—	—	—
Farmall F-20	7	40	30	20,20W	10W	64	140	90	4	140	90
Farmall F-30	7	40	30	20,20W	10W	56	140	90	4	140	90
Farmall H, HV	6	30	30	20W	10W	48 ²¹	90	90 ²¹	6	90	90 ²¹
Farmall M, MV	8	30	30	20W	10W	104 ²¹	90	90 ²¹	6	90	90 ²¹
Farmall MD, MDV	9	30	20,20W	10 ²²	10W ²²	104 ²¹	90	90 ²¹	6	90	90 ²¹
Farmall Cub	3	30	20,20W	10W	10W	3½	90	90 ²³	2	90	90 ²⁴
W-4, O-4, OS-4	6	30	30	20W	10W	48	90	90 ²⁵	—	—	—
W-6, O-6, OS-6	8	30	30	20W	10W	104	90	90 ²⁵	—	—	—
WD-6, ODS-6	9	30	20,20W	10 ²²	10W ²²	104	90	90 ²⁵	—	—	—
W9, WR9	11	30	30	20W	10W	80	90	90 ²⁶	—	—	—
WD9, WDR9	11	30	20,20W	10 ²⁷	10W ²⁷	80	90	90 ²⁶	—	—	—
Model 10-20	7	40	30	20,20W	10W	48	140	90	—	—	—
W-30	7	40	30	20,20W	10W	64	140	90	—	—	—
15-30	9½	40	30	20,20W	10W	96	140	90	—	—	—
Farmall Tractor (1924-1932)	7	40	30	20,20W	10W	64	140	90	4	140	90
MINNEAPOLIS-MOLINE—											
GT	10	30	30	20,20W	10W	104	140	90	—	—	—
GTA, UTS, UTU	9	30	30	20,20W	10W	104	140	90	—	—	—
RTS, RTN, RTU	7	30	30	20,20W	10W	36	140	90	—	—	—
ZTS, ZTN, ZTU	7	30	30	20,20W	10W	56	140	90	—	—	—
OLIVER—											
All "60" Models	4	30	30	20W	10W	48	140	90	—	—	—
All "70" Models	5	30	30	20W	10W	52	140	90	—	—	—
All "80" Models	8	30	30	20W	10W	96	140	90	—	—	—
OLIVER "CLETRAC"—											
Crawler Type—Gasolene Engine—											
AG, AGH	5	40	30	20,20W	10W	64 ³²	28	28	—	28	28
AG-6, AG-6H	8	40	30	20,20W	10W	64 ³²	28	28	—	28	28
BG, BGH	6	40	30	20,20W	10W	72 ³²	28	28	—	28	28
BGS, BGSH	7	40	30	20,20W	10W	72 ³²	28	28	—	28	28
CG, CGH	8	40	30	20,20W	10W	104 ³²	28	28	—	28	28
DG, DGH	12	40	30	20,20W	10W	104 ³²	28	28	—	28	28
HG	5	30	30	20W	10W	16 ²⁹	28	28	1½	28	28
Crawler Type—Diesel Engine—											
AD, ADH ³⁰	13	30GP	30GP	20,20GP	20GP	64 ³²	28	28	—	28	28
BD, BDH ³⁰	12	30GP	30GP	20,20GP	20GP	72 ³²	28	28	—	28	28
DD, DDH ³⁰	16	30GP	30GP	20,20GP	20GP	104 ³²	28	28	—	28	28

SEE CHART FOOTNOTES ON NEXT PAGE

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HEAVY DUTY MOTOR OIL

TOP QUALITY MOTOR OIL FOR YOUR HEAVY DUTY OPERATIONS

When your truck or tractor demands an exceptionally rugged top-quality lubricant for severe operations, Cities Service Heavy Duty Motor Oils—the workhorse of motor oils—are your answer.

These Cities Service Heavy Duty Motor Oils will stand up under real tough going . . . will keep on protecting and lubricating your engine. They are chemically fortified to resist oxidation and keep engines clean . . . to assure better performance.

Ask your Cities Service Farm Representative for the correct grade to use.

STANDS UP WHEN THE GOING IS TOUGH

FOOTNOTES TO LUBRICATION CHART

- ¹ Capacity with belt pulley 14 qt.
- ² Transmission and differential capacities combined on chart. Transmission capacity 8 pt. or lb.; differential capacity 12 pt. or lb. If equipped with power take-off, transmission capacity 10 pt. or lb.
- ³ If equipped with belt pulley, capacity 24 pt.
- ⁴ Use SAE 60 above +70°F., SAE 40 from +70°F. to +32°F., SAE 30 below +32°F.
- ⁵ If equipped with belt pulley, capacity 6 pt.
- ⁶ If operating under constant heavy load below +10°F., use No. 20W. If operating on kerosene, distillate or under heavy load above +65°F., use SAE 30.
- ⁷ Lubricate gasoline starting engine crankcase with SAE 20, 20W above 32°F., SAE 10 below 32°F. Below 0°F., dilute SAE 10 with 10% kerosene to provide fluidity for easier starting.
- ⁸ Dilute SAE 10 with kerosene to provide fluidity for easier starting.
- ⁹ Use SAE 140 for temperatures over 90°F. or for continuous use during summer. For extremely low temperatures, dilute SAE 80 with kerosene to provide fluidity.
- ¹⁰ When equipped with oil filter, capacity 14 qt.
- ¹¹ Fill models previous to 1936 to 5 inches (capacity 40 pt. or lb.). Fill to depth of 6½ inches on 1936 and later models except 7 inches on 35 tooth sprockets (capacity 64 pt. or lb.); 8 inches on 28 tooth sprocket (capacity 80 pt. or lb.).
- ¹² When operating in extremely cold temperature dilute transmission and differential lubricant with ½ pt. and final drives with ¼ pt. No. 10W.
- ¹³ Below +32°F. drain 4 pt. oil and replace with 4 pt. No. 10W.
- ¹⁴ Below +32°F. drain 1 pt. oil and replace with 1 pt. No. 10W each unit.
- ¹⁵ Below 0°F. SAE 80 may be used in transmission or dilute SAE 90 with kerosene. 3 qt. in T-9, TD-9 and 2 qt. in T-6, TD-6. Final Drive (each unit) ½ pt. in T-9, TD-9 and ¼ pt. in T-6 and TD-6.
- ¹⁶ (TD-6, TD-9) Dilute oil with kerosene or Diesel fuel as follows: (TD-6) above +10°F., 1 qt. to 8 qt. of SAE 10; below +10°F., 2 qt. to 7 qt. of No. 10W. (TD-9) above +10°F., 1 qt. to 10 qt. of SAE 10; below +10°F. 2 qt. to 9 qt. of No. 10W.
- ¹⁷ Below 0°F. SAE 80 may be used or dilute SAE 90 with kerosene; 3 qt. in transmission, and 1½ pt. in each final drive unit.
- ¹⁸ Below 0°F. SAE 80 may be used, or dilute SAE 90 with kerosene; 4 qt. to transmission, and 1 qt. to each final drive unit.
- ¹⁹ Transmission capacity—16 pt. or lb.; differential capacity—32 pt. or lb.
- ²⁰ Below 0°F., dilute SAE 90 with 1/6 volume kerosene.
- ²¹ Capacity increased if equipped with pneumatic tires. Fill to filler plug level. Below 0°F. dilute SAE 90 with 1/6 volume kerosene.
- ²² Dilute oil with kerosene or Diesel fuel as follows: Above +10°F., 1 qt. to 8 qt. of SAE 10; below +10°F., 2 qt. to 7 qt. No. 10W.
- ²³ Below 0°F., dilute SAE 90 with ½ pt. of kerosene.
- ²⁴ Below 0°F., dilute SAE 90 with ¼ pt. of kerosene.
- ²⁵ Below 0°F., dilute SAE 90 with 1/7 volume kerosene.
- ²⁶ Below 0°F., dilute SAE 90 with 2 gallons of kerosene.
- ²⁷ Dilute oil with kerosene or Diesel fuel as follows: Above +10°F., 1 qt. to 10 qt. of SAE 10; below +10°F., 2 qt. to 9 qt. of No. 10W.
- ²⁸ Use SAE 60 above 70°F. SAE 40 or 50 from 32°F. to 70°F. Below 32°F. use SAE 30.
- ²⁹ If equipped with belt pulley, capacity of transmission and differential 20 pt.
- ³⁰ Use SAE grade as a guide. Select grade of motor oil which permits Visco-Meter hand to remain in "Run or Ideal" range at operating temperatures.
- ³¹ In the New England and Middle Atlantic States use P-V Oils of same SAE grades.
- ³² Capacity of transmission, differential and final drives.
- ³³ Use SAE 30 above 50°F.

GUIDE TO PROPER TRACTOR PARTS LUBRICATION

KEY TO ABBREVIATIONS:

A-0, A-1, A-2, A-3—Trojan Grease A-0, A-1, A-2, A-3;
EO—Engine Oil;
GO—Trojan or Koolmotor Gear Oil (See Chart on pages 14 and 15).
W-5—Trojan Grease W-5.
ST—Trojan Steering Gear Oil or GO.

Unit or Part	Pressure Fitting	Grease Cup	Oil Cup or Hand Oiled or Hand Packed	Remarks
Engine	See Cities Service Tractor Chart or manufacturer's recommendation.			See Pages 14 and 15
Transmission, Differential and Final Drive	See Cities Service Tractor Chart or manufacturer's recommendation.			See Pages 14 and 15
Fan	A-0, A-1 or A-2	A-3	EO	Some Tractors have fan lubricated from engine, others grease packed at factory, in which case no additional lubrication required.
Water Pump	W-5	W-5	EO	Some Tractors have impregnated bronze bushing, others grease packed at factory, in which case no additional lubrication required.
Steering Gear	ST			Some Tractors have fitting to lubricate steering gears, others have a plug or cover plate which must be removed.
Magneto, Starter, Generator			EO	Some use impregnated bearings or are packed when assembled. No additional lubrication required.
Distributor Shaft	A-0, A-1 or A-2	A-3	EO	
Universal Joints				Trojan Grease, or GO. See Chart on pages 14 and 15 for correct grade number and type.
Wheels	A-2 or A-3	A-3	A-2 or A-3	For Plain Bearings provided with oil reservoir, use Trojan or Koolmotor gear oil S.A.E. No. 140, Summer; S.A.E. 80, Winter.
Rear Axle Outer Bearings		A-3		
Master Clutch Pilot Bearing Release Bearing Clutch Shift Collar	A-0, A-1 or A-2			Some Tractors have clutch throw-out mechanism automatically lubricated from engine.
Power Take-Off, Belt Pulley, Motor Lift and Power Reduction*	A-0, A-1 or A-2	A-3		Where separately lubricated.
Other Chassis Points	A-0, A-1 or A-2	A-3	EO	
Crawler Track Wheels	ALLIS-CHALMERS With "Positive-Seal" Assemblies:— Koolmotor Motor Oil; Above 32° F. Use S.A.E. 50; below 32° F., use S.A.E. 30; or Trojan Grease P-O, summer and winter. Without "Positive-Seal" Assemblies (if equipped with fittings):— Trojan or Koolmotor Gear Oil: Above 32° F. use S.A.E. 140; 10° F. to 32° F. use S.A.E. 90; below 10° F. use S.A.E. 80. Other Models (Grease Lubrication): Use Trojan Grease A-0 or A-1, or Tractor Roller Lubricant No. 00 or No. 1. CLETRAC: Trojan or Koolmotor Motor Oil: S.A.E. 20 to 60, depending on atmospheric temperatures. OTHERS: Grease Lubricated: Trojan Grease A-0 or A-1, or Tractor Roller Lubricant No. 00 or No. 1. Oil Lubricated: Trojan or Koolmotor Gear Oil S.A.E. No. 80 or 140, depending on atmospheric temperatures.			

* Use Trojan or Koolmotor Gear Oil on Gears.



FARM-TESTED GEAR OILS

For every one of your gear lubrication needs, there are farm-tested Trojan or Koolmotor Gear Oils that stand up under the most severe operating conditions. Trojan or Koolmotor Gear Oil protects gears and bearings of transmissions and differentials against the injurious effects of frictional heat and pressure. Ask your Cities Service representative to tell you about them.

CITIES SERVICE

Lubrication Chart

FOR GENERAL FARM MACHINERY

Key to Abbreviations
 MO—Trojan or Koolmotor Motor Oils
 GO—Trojan or Koolmotor Gear Oils
 APO—Trojan or Koolmotor AP Gear Oils
 TA—Trojan Grease Type "A"
 NS—North Star
 TM—Trojan Grease Type "M"
 CC—Cisco Compound
 TW—Trojan Grease Type "W"
 (Number following symbol in chart indicates grade)

UNIT	PART	Oil Cup or Oil Hole	Grease Cup, Plug or Hand Packed	Pressure Gun Fitting or Plug	Hand Oiling	Bath Lubrication	Mechanical Lubricator Circulating System
Binders, Blowers.....	BEARINGS—	MO-30 MO-30	TA-2 TM-2	TA-1 TM-2	MO-30 MO-30	MO-30 MO-30	MO-30 MO-30
Combines, Shellers.....							
Cultivators.....	Plain or Roller.....						
Drills, Harrows.....	Ball.....						
Ensilage Cutters.....	GEARS—				GO-140		
Bailers, Pickers.....							
Grinding Mills.....	Exposed to sand and grit; low to soil.....						
Elevators.....	Exposed but well above soil.....						
Potato Diggers.....	GEARS (Enclosed).....				CC-3-Z	CC-5-Z GO-140	
Power Mowers.....							
Seeders, Spreaders.....	CHAINS (Enclosed).....					MO-20 GO-90	MO-20
Plows, Reapers.....							
Loaders, Power Saws.....	CHAINS (Exposed).....						
Threshers, etc.....							
LIGHTING UNITS.....			TA-1	APO-90			
UNIVERSAL JOINTS.....							
POWER UNITS— (For engines see manufacturer's recommendation.)							
ELECTRIC MOTORS AND GENERATORS.....		MO-20	TM-2		MO-20		
PUMPS:							
Gears (Exposed).....		(See below)				CC-5-Z	
Gears (Enclosed).....		(See below)				GO-140	
Bearings.....		MO-30	TA-2	TA-1		MO-20	
Packing Glands.....			TW-5	TW-5			
MILKING MACHINES.....		MO-10	TM-2	TM-2	MO-10		
CREAM SEPARATORS.....		NS-0	TM-2	TM-2	NS-0	NS-0	

NOTES: Recommendations are for average summer conditions. For winter use or for special conditions see your Cities Service representative.
 Apply Cities Service Anti-Corrode on parts liable to rust when not in use. Ask your Cities Service representative for type and grade.

GEARS

Exposed—Coat with Cities Service Cisco Compound 3-Z or 5-Z depending on season, if operating under normal conditions. These compounds contain a solvent which evaporates off leaving an adhesive, plastic coating. In very dusty atmospheres use Cities Service or Koolmotor Gear Oil SAE No. 140.

Enclosed—Where housing is oil-tight, use Trojan or Koolmotor Gear Oil SAE No. 140 in summer, or SAE No. 90 in winter. If housing is not adequately sealed and leakage occurs, add about 50% Trojan Grease A-O and keep level below point of leakage.

CHAINS

Roller Type, Exposed—Penetration of lubricant between pins and rollers is important. Lubricate with Trojan or Koolmotor Gear Oil SAE No. 140 or No. 90. Best results can be obtained by removing chains periodically and cleaning thoroughly in Cisco Solvent. Dry and soak in warm Trojan or Koolmotor Gear Oil SAE No. 90 or No. 140.

Roller or Silent Types, Enclosed—If separately lubricated use Trojan or Koolmotor Motor Oil SAE No. 20. Other-

wise correct lubricant depends upon parts housed with the chain.

Malleable Iron or Stamped Steel Type—Where operating conditions permit, brush with Trojan or Koolmotor Gear Oil SAE No. 90 or No. 140. If dust or other foreign matter is likely to stick to chain and impair operation, these chains should run dry.

When chains are not in use for a considerable period of time, coat them with Cities Service Anti-Corrode to prevent rust. Consult Cities Service representative for correct type.

WIRE ROPE

Wire rope needs lubrication between the strands and not merely a coating on the outside. Clean with Cities Service Penetrating Oil, and apply Cisco Compound 3-Z or 5-Z depending on season.

If cable is to be used in very dusty atmospheres a treatment with the Penetrating Oil alone often will prove sufficient to keep the cable free of dust accumulations. When cables are to be left idle they require protection against rust. Use Cities Service Anti-Corrode of the correct type and grade, or Trojan Grease A-2.

Get Longer Machinery Life with Tough TROJAN GREASES!

The best way to guarantee your farm machinery and equipment against needless wear and expensive repairs is regular application of the correct type and grade of Trojan Grease.

Trojan Greases give you long-lasting protection because they undergo little change in service. They are both heat and weather resistant and a little goes a long way . . . give full protection to all chassis friction points.



Trojan Grease

Type **A**



These greases are designed to protect parts lubricated through gun fittings and for hand packed universal joints and wheel bearings. They are noted for high resistance to heat and water. Outstanding for chassis lubrication or wherever a heavy-duty grease is required. Available in a number of consistencies.

Trojan Grease

Type **P**



For plain bearings in light and medium duty service, where a smooth, buttery grease with high water resistance properties is desired, use one of the Trojan "P" type greases. It's a fiberless lubricant that is 100% dependable.

Trojan Grease

Type **T**



These greases are specially recommended where a brilliant, amber-colored, water-resistant grease is desired. Available in buttery or stringy textures. The latter has high stay-put qualities, favored where grease leakage may be a problem.

Trojan Grease

Type **W**



This lubricant is especially designed for the lubrication of gland type bearings of water pumps. Economical to use and effective. Will not form emulsions if it gets into the cooling system of engines.

Save on repair bills with service-proved TROJAN GREASES!

PERSONALITIES IN THE FARM NEWS

H. H. Bennett

The "Father" of Soil Conservation in the U.S.A.

It will be some time yet before another man comes along to strike more savage blows against the menace of erosion than has North Carolina's Hugh H. Bennett, Mr. Soil Conservation himself.

Ever since 1903, Dr. Bennett has recognized that erosion of the soil is far more grave than any other agricultural problem or group of problems. That was the year he graduated from the University of North Carolina and went to work for the Bureau of Soils of the United States Department of Agriculture as a soil chemist. It didn't take him long to perceive the threat of erosion to this nation's agricultural economy.

Erosion a Basic Farm Problem

While making a soil survey of Appomattox County, Virginia, young Bennett discovered that accelerated erosion had been a basic farm problem since pre-Civil War days. A short time later he conducted a soil survey in Louisa County, Virginia, with specific instructions to investigate causes of declining crop yields in the area. Comparison of soil depths on cultivated and virgin strips showed that erosion was responsible. An enormous amount of topsoil had been washed away, both in rills or gullies and even layers or sheets.

From this experience and many others, Dr. Bennett armed himself with a huge

This abandoned farmstead forcefully illustrates the disastrous effects of wind erosion.



H. H. Bennett, Chief, Soil Conservation Service

arsenal of factual ammunition for a nation-wide battle to check accelerated erosion and counteract some of its disastrous effects. He became a teacher and educator for this great program, lecturing, writing books and journals and traveling widely to preach the gospel of soil conservation.

After years of discouraging and apathetic response to his pleas for an intelligent program, Dr. Bennett had his day in the sun in November of 1928 when called before a subcommittee of the Lower House to give a full statement of the soil erosion problem and to outline his plans for study and action. As a direct result, the Agricultural Appropriation Bill then under consideration was amended to provide \$160,000 for investigating soil erosion and water conservation, with Dr. Bennett heading both of these vital surveys.

In 1933, Dr. Bennett was appointed director of the Soil Erosion Service, an emergency agency in the Department of Interior equipped to sponsor the first nation-wide action program to combat erosion on agricultural land. When Congress passed the Soil Conservation Act of 1935, Dr. Bennett found himself chief of this service.

Special "Bennett Day" Proclaimed

Many honors and laurels have since come to Dr. Bennett, from Alaska to South Africa, but none probably pleased him so much as "Hugh Bennett" Day on Sept. 9, 1946, a special day proclaimed by the Governor of North Carolina. They say a prophet is without honor in his own country, but this event was put across by the Brown Creek Soil Conservation District, first unit of its kind in the nation—in Hugh Bennett's native Anson County.

The nation's farmers owe a lasting debt to Dr. Hugh Bennett.

Ervin Martin

Indiana's Foremost Future Farmer

Handling a one-man hay baling outfit in the field or serving as toastmaster at an agricultural meeting, it's all in the day's work for Ervin Martin, 21-year-old past president of the Future Farmers of America from Salem, Indiana.

As national F.F.A. president for 1947-48, Ervin attended 12 state conventions, traveled more than 52,000 miles, and spent 200 days in F.F.A. work.

Tie that schedule to the work on a 200-acre grain, hog and dairy cattle farm and you see he was a mighty busy boy.

"My dad gets the credit for the farm work last year," Ervin said. "If he wasn't 100 per cent behind me I couldn't have done all the traveling."

Ervin is the son of Mr. and Mrs. Carl Martin, Route 4, Salem, and he farms in partnership with them. He personally owns a truck, tractor, pick-up baler and other equipment that he uses for custom work. He has full ownership of 12 brood sows. Ervin likes Hampshires; Mr. Martin likes Polands, so their hogs are kept separately. Ervin owns one-third interest in the 35 Jersey milk cows.

Becoming national president of the Future Farmers of America was just another logical step in his development.

On Navy LST

He was elected vice-president of the Salem chapter as a junior in high school, served again as vice-president in his senior year; won the F.F.A. State Farmer degree in 1944 and was elected vice-president of the state F.F.A. association. In 1945 he put in his application for the American Farmer Degree, but by the time it was awarded that fall he was in the Pacific on a Navy LST.

In the spring of 1947 he was elected Indiana state F.F.A. president. Then, at Kansas City in the national convention that fall, the delegates decided he was their first choice for national president.

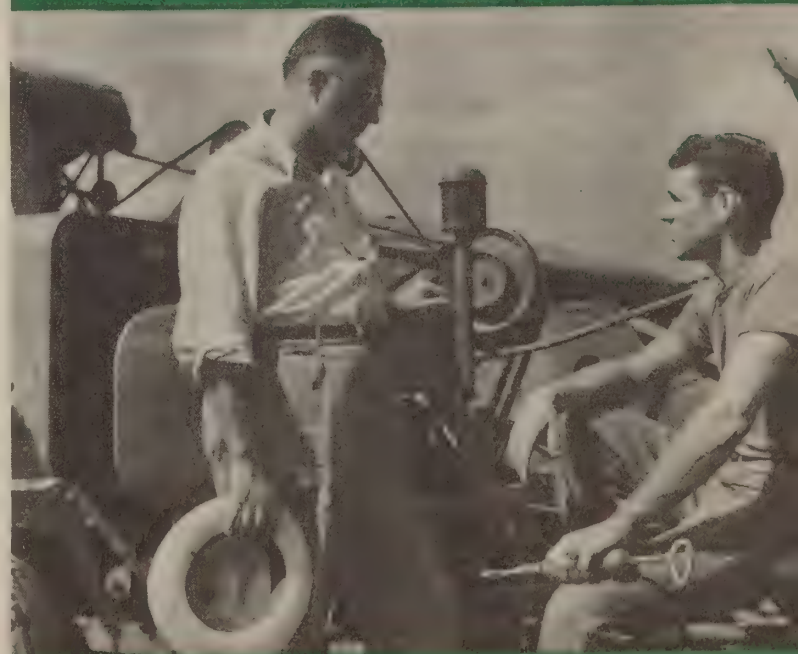
The leadership he has exhibited and all his F.F.A. accomplishments serve as a constant reminder to farm boys everywhere that their Future Farmers of America organization presents great opportunities to boys who will take the ball—and run with it.



Ervin Martin, National President, Future Farmers of America during 1948



Here young Martin receives the president's gavel from Gus Douglass, Jr. at 1947 F.F.A. Convention.



Ervin and his vo-ag teacher, W. C. Brannan, are great pals. They are seen here Martin's farm near Salem.

The Leonhards

Tops In Farm Families

*"We'll back you to stand
'Gainst the best in the land!"*

The authors of the renowned Illinois Loyalty song who wrote those words could have been talking about the Leonhards of Illinois' Cass County. Certainly, insofar as farm families go, Floyd M. Leonhard, his wife and two sons made a standout contribution during 1947 to more satisfactory living on their farm, in their community, state and nation.

That was the joint verdict of the Agricultural Extension Service of the University of Illinois College of Agriculture and the Gulf, Mobile and Ohio Railroad. These organizations carefully considered the contributions to better farm living made by families in 29 agricultural counties in Illinois and came up with the Leonhards as one of the best. The Gulf, Mobile and Ohio recognized this agrarian excellence with a recreational and education tour through the Southland which this family won't forget soon.

Nominated by Neighbor

A neighbor of the Leonhards, Mrs. Nellie R. Kruse of Virginia, Illinois, in nominating them for the Family of the Year honor, made it abundantly clear that they are real leaders in Cass County.

Mr. Leonhard not only served on the committee that organized the Cass County Soil Conservation District, but practiced what he preached by pioneering soil conservation on his own farm. All his farming is done on contour and with strip cropping. He uses legumes, rock phosphate, and lime exclusively. And in 1947, he built two new grass waterways and laid over 3000 tile.

Floyd Leonhard takes a vital interest in school, religious and community activities, being a director of the school district; elder, budget director and treasurer of the Shiloh Cumberland Presbyterian Church; and a representative from Sangamon Valley Township on the county board of supervisors.

Mrs. Leonhard is church organist and writes monthly programs for a missionary magazine distributed throughout the entire Presbyterian denomination. She is also on the board of directors of the



Like all successful farm families, the Leonhards keep accurate records of their activities.

Cass County Home Bureau and was chairman of the county committee for 4-H Home Economic Clubs.

As for neighborliness, Mrs. Kruse explains: "The Leonhards are good neighbors. Wherever there is need in their community they are quick to sense it and assist, encourage and supply material things."

Keep Complete Records

Last year Mr. L. planted over 100 wind-break trees to protect home and livestock, made a concrete feed lot and installed an electric pump jack for livestock watering. It is hardly surprising that the Leonhards keep sound farm records and operate on a healthy financial basis.

Mrs. Leonhard is energetic about the house and has over 1,000 quarts of foodstuff canned. Their eight-room house is modern throughout and boasts the latest household appliances.

The Leonhards have two sons—a husky little lad of five and an older boy who has been honorably discharged from Naval service. Mother, father and sons are in excellent health and carrying the ball for farm, home and community.

Here is one man's family that embodies the best in American farming.

The Leonhards in a family group. Cass County, Illinois, farmers recognize this family as tops.





Miss Warren

**Has Devoted 31 Years
to 4-H Club Members**

Millions of adults who have belonged to the 4-H Club since 1917, as well as hundreds of thousands now in the organization, admire and respect Miss Gertrude Warren for her outstanding work with 4-H'ers.

Just three years after the establishment of 4-H Club work on a national scale, Miss Warren became associated with the organization. In the 31 years that have elapsed since then she has worked untiringly to help make the club the potent force it now is in the lives of rural youth.

Leader in 4-H Expansion

She has had much to do with the development and the expansion of the 4-H program for these boys and girls and no small credit is due her that today there are more than 1,700,000 members.

Miss Warren is the author of Bulletin No. 320, "Organization of 4-H Club Work For Use of Local Leaders." It is a tribute to this gracious lady that for many years this publication has been a standard guide to 4-H Club work. In 1948 she revised it and brought it up-to-date.

Promoted 4-H Club Camp

She is now a leader of Club work in the Washington office of the Cooperative Extension Service. When the members get together for national conclaves, her name has been prominent among the leaders of the program. She was one of



Miss Gertrude Warren, 4-H leader is known by thousands of members from coast to coast. She is shown above with President Truman.

those responsible for the establishment of the National 4-H Club Camp held each year in Washington, to which come two boys and two girls and also two leaders from each State.

The Citizenship ceremony in which 4-H members all over the country take a good citizenship pledge when they become old enough to vote is another project of hers. This program with appropriate ceremonies, has done much to make 4-H'ers realize the importance of their responsibility as citizens. In addition to her regular duties, Miss Warren has served on many committees for various youth movements.

She has her Bachelors and Masters degrees from Columbia University. She taught at Columbia University and Simmons College before coming to the Department of Agriculture. While teaching home economics at Columbia, she was asked to develop the homemaking phases of 4-H Club work in the Federal office.

Receives Many Honors

For her work in 4-H Clubs, the Government of Latvia (where 4-H Clubs thrived before the war) conferred upon her the Order of Three Stars for "valuable service rendered in fostering friendly relations between Latvia and the United States, particularly in the field of 4-H Club work." At the National 4-H Club Camp last June, 4-H leaders presented her with a handsome silver service in recognition of her contribution to the 4-H Club movement. In February, 1948, Epsilon Sigma Phi (honorary extension fraternity) presented her with a Certificate of Recognition for "outstanding service as an extension worker in the United States."

Farm Youth Organizations



1949 Will Be Banner Year for 4-H Club

The 4-H Club record for 1948 rolled up into a real milestone for the organization. Enrollment was the highest on record, totalling 1,769,911. Another all-time high was established when 76 percent of all enrolled completed their 4-H Club projects.

In 1948 the theme, "Creating better homes today for a more responsible citizenship tomorrow" was featured at all local, State and national events. It served to highlight the underlying philosophy of 4-H Club work for the program centered in the home and on the home farm.

National Events Calendar

The theme chosen for 1949 is "Better living for a better world." The official national 4-H Club events for 1949 are:

NATIONAL 4-H CLUB WEEK,

March 5-13.

NATIONAL 4-H CLUB SUNDAY, *May 22.*

NATIONAL 4-H CLUB CAMP,

June 15-22.

NATIONAL 4-H ACHIEVEMENT WEEK,

November 5-13.

NATIONAL 4-H CLUB CONGRESS,

November 27-December 1.

National 4-H Club Week

National 4-H Club Week in 1949 is set up to make it possible for all 4-H Club members to become familiar with the 1949 theme and to see that it is emphasized in their 1949 programs. It will provide members an opportunity to check-up on their own efforts to date in carrying out their programs already started. It is a week in which each 4-H'er will try to enroll at least one new member in order to reach the Club's goal of "3,200,000 members by 1950." The public will be informed on a national scale about 4-H work and accomplishments.



THE 4-H CLUB PLEDGE

I pledge—

my head to clearer thinking

my heart to greater loyalty

my hands to larger service, and

my health to better living

for my club, my community and

my country.

The National 4-H Club Sunday is held in conjunction with Rural Life Sunday which has been observed regularly since 1929. It is the fifth Sunday after Easter, a day set apart for emphasizing the meaning of Christianity for rural life. 4-H members will attend and take an active part in services this day.

National 4-H Club Camp

The National 4-H Club Camp will be held in Washington June 15-22 with leading members from the 48 States and territories conferring together to foster the development of a strong rural leadership and gain a better understanding of how the three main branches of Government as well as the USDA and other departments of our National Government operate.

National 4-H Achievement Week will be held from November 5th to 13th this year. As in the past it will be highlighted with recognition awards to groups as well as individuals for their achievements. Reports will be made to the nation of over-all 4-H achievements and the contributions its members have made for better living.

4-H Club Congress

The Club Congress will be held in Chicago from November 27th to December 1st. It will be a gala affair in which numerous awards will be made to local and state contest winners as they compete against each other for national recognition. Girls as well as boys will converge upon the Windy City. Scholarships will be given for homemaking ability as well as for ability to raise prize stock.

In addition to these national events in 1949, there will be hundreds of other regional events such as the Eastern States Exposition at Springfield, Massachusetts, and interstate affairs. It looks like the best year yet for the 4-H Club!



recognized and praised. The possibility of public acclaim stimulates them to greater achievement in their individual and local chapter activities.

The Future Farmers of America Foundation is growing steadily and giving additional stimulus to F.F.A. members. It was established in 1944 to provide awards to boys who achieve outstanding results in their vocational agriculture work and F.F.A. activities. Its 1949 program is expected to provide about \$80,000 in awards, with twenty-six commercial and industrial organizations and individuals participating as donors. Continued expansion of the Foundation is expected as it becomes better known.

Achievement in the F.F.A. is based on the initiative and energetic work of farm boys under adult guidance. Vocational agriculture instructors meet with their F.F.A. members every school day and make frequent visits to the individual boys' farm homes. Such a relationship provides a closely-knit F.F.A. chapter organization that is able to set its objectives high—and reach them.



The big event each year in the life of a Future Farmer is the annual convention held at Kansas City.

FUTURE FARMERS OF AMERICA LOOK AHEAD

by

A. W. Tenney

National Executive Secretary

The Future Farmers of America organization, twenty years old, is looking ahead to a period that should see great expansion in membership and achievement.

General objectives of the F.F.A. for 1949, and succeeding years, will be the same as those that have brought such outstanding results in the past. The overall objective is to develop, in farm boys, the qualities of leadership and citizenship that, along with their training in vocational agriculture, will enable them to become successful farmers and good citizens.

At this writing, specific dates have not been set for all 1949 national F.F.A. activities. These activities will include National F.F.A. Week February 19-25; national livestock, dairy and poultry judging contests in October, and the annual national F.F.A. convention, probably in October in Kansas City.

Membership in F.F.A. is expected to increase again in 1949, and probably should reach 275,000. The organization is beginning to receive wide recognition from press, radio and the public; recognition that was sorely lacking in the F.F.A.'s first years of development. Boys are more anxious to become members of an organization that is widely



FFA's No. 1 Farmer for 1948



Kenneth L. Cheatham, nineteen-year-old farm boy from Greenville, Illinois, was named Star Farmer of America at the club's annual convention in Kansas City last fall. In addition to being honored for his accomplishments in farming and rural youth leadership, young Ken received a \$1,000 check from John M. Collins, editor of the weekly Kansas City Star, sponsor of Star Farmer awards for the past 20 years.

Cheatham has developed a farming program since 1943 that has netted him more than \$9,000 in profits. He owns land, machinery, buildings, equipment and livestock valued at more than \$22,000. Kenneth served one year as State F.F.A. president.

He married his high school sweetheart, Miss Lois Hunter, last summer and they're doing a fine job of modernizing and rebuilding an old seven-room house for their farm home.



Cities Service TIRES

are built to give you MORE miles at LOWER cost

FOR CARS



The deep, claw-grip tread of Milemaster gives quicker stops, safer turns, full traction at no premium cost. More working rubber on the tread means less wear, increased mileage. Milemasters are built to take all kinds of road punishment. Immersion dipped cords, double breaker strips give stronger carcass support, longer wear. First chance you get ask your Cities Service Farm Representative about Milemasters.

CITIES  SERVICE

MILEMASTER TIRES



FOR TRACTORS

The rear-wheel tractor tire that gives you maximum traction and long, trouble-free service. Loadmasters have greater strength because of their "double-buttress" continuous tread. They give positive traction with their "double-curved" cutting edges. They are self-cleaning and smooth rolling. You're on the right track when your tractor rolls on Cities Service Loadmasters . . . the long-life tractor tire.

CITIES  SERVICE

LOADMASTER TRACTOR TIRES

FOR TRUCKS



Built to take punishment in general truck operation, Speedmasters last longer because they're cooler running and bruise resistant. You get complete 3-in-1 changeability . . . for front, driving and trailer wheels. Speedmasters steer smoothly and easily . . . provide better traction, better starts and stops. And the extra stability plus deep tread design mean more safe miles at less cost.

CITIES  SERVICE

SPEEDMASTER TIRES

FOR CARS



The Cities Service Tractionmaster tire is designed for use by farmers who have to combat mud or snow when driving. The solid rubber traction spikes of the Tractionmaster tread literally punch their own track into the deep mud or snow. The tread has a flexing-action that makes it self-cleaning. Each multi-edge spike has sharp, non-skid ridges to grip the road more securely and give protection against skids in any direction. Submerged connecting ribs reinforce each traction spike, giving the extra strength a tire needs for rough and tough country driving.

CITIES  SERVICE

TRACTIONMASTER TIRES

A good tire deserves a good tube. We've got good tubes . . . Cities Service Airmasters. They are stronger . . . offer greater resistance to heat, water, oil and weather . . . provide far greater air retaining ability. Make sure you have them in your new tires.

AIRMASTER BUTYL TUBES



*Safer.
Stronger.
Better*

Livestock



Brucellosis (or Bangs' Disease) in cattle may be prevented from spreading and its resulting disease in humans—undulant fever—reduced by the use of a new brucella vaccine for immunization of cattle developed by Dr. I. Forrest Huddleson, Michigan State College bacteriologist.

The new vaccine has been used in wide-scale tests on Michigan dairy herds. It was first released through members of the veterinary profession in November, 1947. In the two years prior to this, the use of "Brucella (M) Vaccine" on cattle in private herds limited the spread of the disease to 4 per cent of the susceptible animals.

Virginia, Ohio, Tennessee and Virginia. The test in West Virginia was recently concluded but it will take almost a year more to further determine the value of the new vaccine.

Dr. Huddleson said herds not infected with brucellosis have been treated with the vaccine to determine if it produced any harmful effects in breeding efficiency or milk production. It had no adverse effect upon either, the scientist remarked.

It was found that 43% of the suspect reactors—those animals in which there was a doubt about infection—became negative to the blood test after vaccination. Whether use of the vaccine on infected animals is economical is a question, Dr. Huddleson said, reporting only 11.8 per cent of the infected animals became negative to test.

The great value of the new vaccine is seen in the possibility of preventing the spread of the disease in animals of recently infected herds. By doing so it will become possible to eliminate infected

NEW BRUCELLOSIS VACCINE SHOWS PROMISE

Work in the new vaccine started in 1945. It is a suspension of live and dead bacterial cells of one of the mucoid growth phases of *Brucella suis*. The Michigan State College laboratory is able to produce enough vaccine for 2,000 inoculations daily.

Since no federal license has been obtained, the vaccine now being produced by the laboratory cannot be distributed outside the state of Michigan. However, the Bureau of Animal Industries issued permits for large-scale tests in West

animals, immunize the remainder and not only have a disease-free herd but one which is immune from brucellosis.

From the standpoint of human life and suffering, the elimination of brucellosis would mean halting the spread of undulant fever.

The injection of the vaccine produces a slightly positive blood reaction which disappears within 90 days. The dosage of the vaccine is the same for animals of all ages. It is not necessary to vaccinate calves under 6 months of age.

For Tractor—Car—and Truck

Choose **Heat-Proved**

CITIES  SERVICE

Motor Oil



Cities Service Motor Oil represents high quality at a moderate price. It is heat-proved—will stand up under extreme operating conditions—gives maximum protection. Cities Service Motor Oil made from high quality, mid-continent crudes gives long-lasting, economical lubrication.

And for an even greater saving—do as most farmers do—order Cities Service Motor Oil by the drum from your representative. There's not only a sizeable saving but it's much more convenient, too.

From the standpoint of conserving dry matter, protein and carotene, silage-making is an efficient way to store legumes. Excellent results have been obtained from feeding high-quality legume silage.

Under varying weather conditions, first-class legume silage is most likely to be made when suitable preservatives are used. Legumes may be successfully ensiled without preservatives, however, if the proper precautions are taken. If preservatives are used, corn molasses will be one of the most desirable preservatives to use this year, considering its cost. Sixty to 70 pounds of molasses should be used to each ton of green forage.

Ensiled Without Preservatives

When legumes are ensiled without the use of preservatives, the following suggestions are recommended by C. S. Rhode, dairy extension specialist, University of Illinois College of Agriculture:

1. Cut the legumes when they have reached the late hay stage.

2. Be sure the silo is airtight with smooth walls. Make needed repairs before silo-filling time.

3. Wilt the crop slightly. To make good silage, legumes and immature grasses should be wilted only slightly after they are cut. When put into the silo, the grass should have a moisture content not higher than 68 per cent, not lower than 60 per cent.

Unless the crop is heavy, or very immature, the time required to wilt it may be one or two hours on good drying days. During a prolonged dry spell, crops cut at the usual haying stage will be dry enough to ensile within a few minutes after cutting. On humid days, half a day to a day may be required. During rainy weather, the mowed crop may be

BETTER COWS WITH LEGUME SILAGE

in the field two or three days before it is dry enough to be siloed.

Avoid Too Rapid Wilting

To keep from wilting some of the crop too much, it is usually advisable to cut no more at one time than can be ensiled in half a day. To avoid too rapid wilting, use a windrowing attachment on the mower cutter bar or follow close behind the mower with a side delivery rake. If the crop is not too heavy, combine two mowed swaths into one windrow to speed up loading and filling.

4. For best results, set the cutter for a $\frac{1}{4}$ -inch cut. Chopping fine causes the crop to pack quickly and more completely. This is a must in making silage by the wilting method.

5. Distribute the silage evenly and tramp it thoroughly in the top third of the silo. All of the material put in the top third of the silo should be wilted only slightly.

6. Put four to six feet of heavy, unwilted silage at the top.

7. When filling is completed, level off the top and leave the silage slightly higher near the wall than at the center.

8. Legume silage exerts extra pressure on the silo. Consequently silos that have not been constructed for legume silage should have additional reinforcement. The pressure of normal corn silage is approximately 11 pounds to the square foot, while legume and grass silage will run about 19 pounds to the square foot.

Good pasture and range are the most economical ways of feeding livestock. They save labor, money and time in the feeding of livestock. Good pasture may be worth more per acre than normal cash crops.



BALANCED DAIRY FEEDING CHART

Here's How to Balance

Your Ration:

Decide which class of roughage you are feeding—Above Average, Average or Below Average (see headings).

Select a feed mixture under this roughage class. Your choice will be determined by the feeds you have on hand and by those you can get. See Groups of feeds A, B, C, D, above.

When feed of any group is called for, one or more may be used. If possible, use three or more feeds in your mixture.

FOR ABOVE AVERAGE ROUGHAGE OR GOOD PASTURE

Good leafy alfalfa, soy bean or choice clover hay fed with corn silage.

MIX NO. 1

900 lbs. A feed
100 lbs. D feed

MIX NO. 2

850 lbs. A feed
100 lbs. B feed
50 lbs. D feed

MIX NO. 3

800 lbs. A feed
200 lbs. C feed

MIX NO. 4

500 lbs. A feed
500 lbs. B feed

If the hay is above average and is fed with grass silage or without any silage, use a grain mixture made up of Group A feeds alone. This is also suitable for cows on excellent pasture.

FOR AVERAGE ROUGHAGE OR FAIR PASTURE

Good mixed hay or fair legume hay feed with or without corn silage.

MIX NO. 5

800 lbs. A feed
200 lbs. D feed

MIX NO. 6

700 lbs. A feed
100 lbs. B feed
100 lbs. C feed
100 lbs. D feed

MIX NO. 7

650 lbs. A feed
350 lbs. C feed

MIX NO. 8

Straight 16% dairy feed

FOR BELOW AVERAGE ROUGHAGE OR POOR PASTURE

Timothy or other grass hay feed with or without corn silage.

MIX NO. 9

700 lbs. A feed
300 lbs. D feed

MIX NO. 10

600 lbs. A feed
200 lbs. C feed
200 lbs. D feed

MIX NO. 11

600 lbs. A feed
100 lbs. B feed
100 lbs. C feed
200 lbs. D feed

MIX NO. 12

450 lbs. A feed
200 lbs. B feed
200 lbs. C feed
150 lbs. D feed

A—FEEDS

Farm grown grains—low in protein

ground corn

ground oats

ground barley

ground wheat

corn-and-cob meal

ground rye

B—FEEDS

Medium in protein

wheat bran

16% dairy feed

wheat middlings

C—FEEDS

Medium rich in protein

corn gluten feed

24% dairy feed

dried brewers' grains

24% peanut meal

malt sprouts

distillers' dried grains

D—FEEDS

Rich in protein

linseed meal

cottonseed meal

soybean oil meal

41% peanut meal

ground soybeans

32-34% dairy feed

corn gluten meal

PROTECT the finish on your car with
CITIES  SERVICE AUTO GLAZE



Here's a two-in-one product that cleans as it polishes. It restores the original luster and gives a high gloss finish that won't collect harmful dust and grit. The application of Cities Service Auto Glaze is simple and easy—the elbow grease is in the can.

The Battle Against Foot-and-Mouth Disease

Interest in foot-and-mouth disease commonly known as hoof and mouth disease has been keen since the serious outbreak that appeared in Mexico in November, 1946. While there are widely opposed viewpoints concerning the disease and the possibility of it spreading into this country, the USDA Bureau of Animal Industry is confident that with the exercising of proper precautions and the cooperation of the public, the disease can be suppressed.

Foot-and-mouth disease is an extremely contagious disease of cattle, sheep, goats, swine and other cloven-hoofed animals. It causes blisters and sores on the membranes of the mouth and tongue, and on the skin around and between the divided hoofs. It may also affect the udders and teats of milk-producing animals and the snouts of hogs.

The disease is feared because it spreads so rapidly and because it leaves its victims thin and otherwise in impaired condition for meat or milk production. It also reduces the value of animals for breeding purposes.

Several Outbreaks Here

Foot-and-mouth disease has long been established in most countries of Europe, Asia, Africa and South America. As a result, susceptible animals in these areas have built up a resistance to the disease. The United States has had several outbreaks in the last 80 years but has eradicated them all.

This country is now cooperating with Mexico in suppressing the outbreak that has spread to 16 Mexican States. Ex-

perience and scientific study have shown that the quickest and surest way to stamp out the disease is to kill and bury affected and exposed herds and to disinfect the premises they occupied.

During the first year of the outbreak in the infected areas nearly a million animals were destroyed. At the end of that time the United States found it necessary to consent to Mexico's request for a control program that would have a less severe effect on her agriculture and other industries.

The joint Mexican-United States commission formed to combat the disease in Mexico established a northern quarantine line across central Mexico in the summer of 1947. Since then no case of foot-and-mouth disease has been detected north of the line.

Vaccination Program

Vaccines in use so far give immunization for 1 to 6 months. Bureau of Animal Industry scientists have visited European countries to study their production of vaccines and the data they have obtained promises to be useful. The joint commission is now producing foot-and-mouth disease vaccine in Mexico in substantial quantities. In cases where centers of infection appear the herds involved are slaughtered and buried and all susceptible animals in the surrounding area are vaccinated, thereby encircling the place of infection with immune animals.

The constant inspection, cleaning and disinfection of vehicles and other conveyances play an important part in keeping down the spread of the disease. During an average month these operations involve about 200 cargo planes, 1700 passenger planes, 4500 railroad cars, 2500 stock trucks and 1600 boats and barges.



Long Lasting

Powerful

CITIES SERVICE

BATTERIES

Cities Service Batteries have won a well-deserved reputation for quality under the heavy demands made by tractors, trucks and cars everywhere. Your Cities Service representative can provide the right type and size to fit your own particular needs.

Features like acid-level control vents to prevent over-filling and spilling—chemically hardened plates—and shock-proof cases give you a "plus factor" that makes Cities Service batteries the best buy for you.



PREVENTION CHART for the

DISEASE	USUAL AGE OF AFFECTED CHICKENS	METHODS BY WHICH THE DISEASE IS SPREAD
		The methods of spread listed below are not the only means by which these diseases may spread but they are the most common methods. The most important of these common methods of spread are printed in <i>bold face type</i> .
<i>Pullorum</i>	<i>1st three weeks</i>	Transmitted through the egg. Spreads in the incubator. From chick to chick through infected droppings and down. Can live over on premises under favorable conditions.
<i>Leukosis</i>	<i>4 months and over</i>	Transmitted through the egg. Easily spread from adult to young chicks. Readily lives from year to year on ground and premises. Spreads through droppings. Can be carried on attendant's or visitor's shoes. Some spread through the air.
<i>Coccidiosis</i>	<i>5 to 14 weeks</i>	Spreads through droppings. Easily spread from adult to young chickens. Readily lives from year to year on ground and premises. Can be carried on attendant's or visitor's shoes.
<i>Tuberculosis</i>	<i>Over 1 year old</i>	Spreads through droppings. Easily spread from adult to young chickens. Readily lives from year to year on ground and premises. Can be carried on attendant's or visitor's shoes. Some spread by careless disposal of dead chickens.
<i>Fowl Pox</i>	<i>Young stock in late summer and fall</i>	Spreads through infectious material thrown off by diseased fowl. Lives over readily on ground or premises. Can be carried by visitors; on attendant's shoes; by mosquitos or other insects.
<i>Cholera</i>	<i>Usually adults</i>	Spreads through droppings. Recovered adults may remain carriers. Lives over. May be carried in by visitors, poultry buyer's coops, animals, or NEW STOCK.
<i>Chick Bronchitis</i>	<i>Day old to 3 months</i>	Spreads through infectious materials thrown off by diseased chickens. Recovered chickens may remain carriers. Spreads through the air and may be carried on attendant's shoes or clothing. Can be carried by visitors and in poultry buyer's coops. Spreads readily in infected incubators.
<i>Colds</i>	<i>Any age</i>	Spreads through infectious materials thrown off by diseased chickens. Recovered chickens may remain carriers. Spreads through the air, may be carried on attendant's or visitor's shoes or clothing, or buyer's coops. Lives over on premises.
<i>Round Worms</i>	<i>After 2 months</i>	Spreads through the droppings. Lives over on ground and premises. Adult chickens are common carriers. Easily carried on attendant's shoes. May be brought in by visitors or animals.
<i>Tapeworms</i>	<i>After 2 months</i>	Must have an intermediate host. Spreads through droppings. Adult chickens may be carriers. Lives over on premises.

Most Common Poultry Diseases

SYMPTOMS SUGGESTING THE DISEASE	PREVENTIVE MEASURES REQUIRING SPECIAL ATTENTION
These symptoms are not positive identification of the disease. Accurate diagnosis requires a post-mortem examination, and, frequently, laboratory tests.	In addition to these special measures, the highest levels of sanitation should be practiced at all times.
Heavy mortality during the first three weeks.	Select carefully the hatchery from which you buy chicks. Its program should include,—All supply flocks blood tested for pullorum, and reactors removed; fewer than 5% reactors found in any flock used,—lower reactions preferred; no custom hatching, incubators cleaned and fumigated between hatches.
Paralyzed legs or wings; irregular pupil of the eye, enlarged and hardened shanks; big liver; tumorous growths in internal organs.	Buy chicks from a hatchery realizing their share of responsibility in leukosis; and <i>rigidly</i> following a program to avoid spread of the disease through the egg. Program should include a system to trace parentage of chicks to the flock which produced the hatching eggs. Brood chicks at least 300 feet away from adult chickens and on "clean" pasture.
Bloody dropping may or may not be present; drowsiness; drooping wings. Paleness and "going light" in pullets or cockerels.	Replace litter every 4 days with a new litter, or follow deep built-up litter system. Place waterers on wire platforms. Litter must stay dry. Brood on "clean" ground. Raise chicks away from adult poultry.
Loss of weight; "going light"; yellowish white spots on liver or spleen. These lumps may be lifted out with the knife.	Sell all adult chickens at end of the first laying year. Raise chicks away from adult poultry. Clean and disinfect houses and equipment before housing pullets. Expose equipment as much as possible to the direct rays of the sun.
Wart-like scabs on comb, wattles, or face; often on eye lids; yellow cankers in the mouth or throat.	Vaccinate when 8 to 14 weeks old; before August 1st; with vaccine of egg embryo origin. Do not vaccinate unless pox has been present on the premises or in the community.
Sudden, heavy death among hens in good flesh; greenish droppings with mucus.	Quarantine all new birds. Vaccination of little or no value.
Hoarseness, gasping for breath, accompanied by sneezing and rattling.	Buy from clean hatcheries that do not have battery brooders near the incubators. Broiler raisers should start all chicks of same age, sell off all of that brood, and allow about a week for cleaning before bringing in baby chicks.
Sneezing, running noses, running or swollen eyes, and rattling when breathing.	Raise young away from adult chickens. Do not house pullets with old hens. Avoid drafts and overcrowding. Feed rations high in Vitamin A. Vaccination of no proved value.
Loss of weight; dull sunken eyes; pale shanks in immature pullets.	Raise young away from adult chickens. Brood on "clean," well drained ground.
Loss of weight; dull sunken eyes; pale shanks in immature pullets.	Flies and dung beetles are the usual intermediate hosts. Keep chickens away from manure piles. Keep milk containers and wet mash troughs cleaned to avoid attracting flies.



Cities Service Radio Program

OLDEST Sponsored Show on the Air

In 1927 the first Cities Service broadcast went on the air. Today the Cities Service program is the oldest network radio show of all. Its 22-year history is studded with names of famous radio personalities such as, Jessica Dragonette, Lucille Manners, Dr. Edwin Franko Goldman, Dr. Frank Black and others.

The program made its debut on February 18, 1927 when the National Broadcasting Company was in its infancy. Each week since then Cities Service dealers and representatives have offered a program for your enjoyment.

Friday, June 4, 1948 marked the inauguration of a new series of Cities Service broadcasts, featuring a 48-piece "Band of America." Every Friday night at eight (EST) this band, under the direction of Paul Lavalley, plays stirring, toe-tapping band classics. All of the best-loved and most familiar marches and melodies of Sousa, Goldman, Gershwin, Cohen, Porter, Stephen Foster, Irving Berlin, Victor Herbert are heard on the Cities Service program.

Your Cities Service representative and dealer cordially invite you to listen each Friday night over your NBC station to the music America loves best. It's their way of saying "Thank You" for your patronage.

FREE TOURING INFORMATION

When you plan your vacation trip, you usually try to take the best roads and the route that is most scenic or has the most interesting historical sites. However, too often, you never seem to find enough time to really plan the trip the way you should. That's why thousands of motorists take advantage of the free service offered by the Cities Service Touring Bureau.

All you have to do is to obtain a Touring Bureau Card from your Cities Service representative or dealer; mark on it your starting point, destination and the type of travel attraction you are most interested in seeing on your trip, and the Touring Bureau takes care of the rest of it! So before going on that vacation trip this year, ask for a Cities Service Touring Bureau card. This free service will help make your 1949 vacation the best yet!

**CITIES  SERVICE
TOURING BUREAU**

Soils AND Crops



"TEST—DON'T GUESS"

by C. M. LINSLEY, Soil Extension Specialist
University of Illinois, College of Agriculture

The testing of soils to encourage and guide farmers in a sound soil improvement program has been a major project in soil extension in Illinois since F. C. Bauer first organized the soil testing program 22 years ago. "Test—Don't Guess" has been a slogan that has been used widely in the state to emphasize that soil needs should be known before fertilizers have been spread.

Farmers have caught on to soil testing. Farmers in the state's 102 counties have been asking for service. County Farm Bureau organizations have set up soil testing laboratories. At present nearly 75 counties have well equipped laboratories competently staffed.

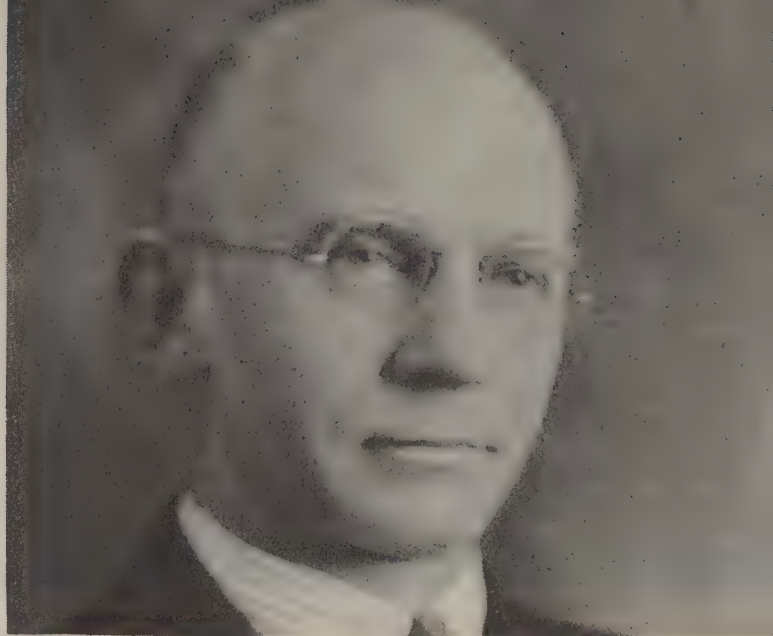
The possibilities of a county laboratory had been demonstrated several years ago when three two-county laboratories were set up under the Works Progress Administration Research Project.

Small Charge Per Acre

In many counties the farmers collect their own soil samples. But as the laboratories have developed their services, farmers have invited samplers to come to their farm and take the samples, test, and make the recommendation for treatment. The complete operation is in the hands of the technician from the laboratory. A small charge of about 35 cents an acre is made to cover the expenses. Many laboratories are now testing from 15,000 to 25,000 acres each year.

The Illinois System of Permanent Soil Fertility which the University of Illinois has advocated for many years is simple and easy to follow. Five steps make up the program:

1. Have the soil tested for acidity, phosphorus, and potassium to find out where



C. M. Linsley. Tests made by him and his colleagues show soil testing pays off 50 to 1.

these materials are needed and how much is needed to the acre.

2. Apply limestone, phosphate, and potash to your land in amounts called for by the soil tests.

3. Grow heavy crops of clover or alfalfa on each field at least every four years to supply nitrogen and organic matter and to help control erosion.

4. Save fertility in manure, straw, and cornstalks and return them to the land to supply organic matter and to conserve plant food.

5. Hold fertility on your sloping land. Where soil treatment and good rotation are not enough to control erosion, use additional erosion-control practices such as terraces, contour farming, and grass waterways. Use rough land for hay and pasture.

Pays Off 50 to 1

These points fit admirably into the soil testing program as followed in the state. Soil testing not only saves the average Illinois farmer \$50 for every dollar spent on testing, but increases needed food production by using every ton of fertilizing material where it will do the most good.

Last year about 60 per cent of the state's 204,000 farmers failed to heed our suggestion of "Test—Don't Guess," as we know they applied over 100,000 tons of rock phosphate and 800,000 tons of limestone on land that didn't need it.

In spite of difficulties the soil testing project seems to have great possibilities as a means of encouraging and guiding farmers in a balanced soil management program. It carries good selling psychology. It has appealed to farmers because they can see where it saves them costly guess work.



You, Too, Can Profit from SOIL CONSERVATION

This is a "before" view of a South Dakota farm. Sand is up to 6 feet in depth. See below for "after" view.

Conservation farming became a national watchword early in the twentieth century, but the need for conservation farming was not fully understood, even by many of our agricultural leaders and scientists, until the middle 1930's.

While rapid progress has been made since that time, there are still many farmers who regard soil conservation as a second-rate problem—as something that can be taken care of "tomorrow." The following facts belie these farmers' opinions: During the last 100 years approximately half of the farmland in the United States has been damaged by erosion; no less than 100 million acres of formerly cultivated land, enough to care for 33 million people, have been ruined for cultivation; the cost of erosion in the United States even today—after all the good progress made in combatting it—is considerably more than a *billion dollars* a year.

You, too, can profit from soil conservation if you are not already doing so. You have to sacrifice nothing in order to keep your land healthy and productive. Soil conservation is an investment. It increases yields, raises farmers' incomes, improves business, and safeguards health and general community welfare.

Conservation Increases Yields

Any farmer gets bigger yields some years than others. Some farmers get bigger increases from soil conservation practices than others. Recently 350 farmers in 12 Northeastern States were asked to help compile representative figures that would accurately answer the question: "How much bigger yields does soil conservation give?"

These farmers not only kept records of crop yields before and after adopting soil conservation methods but also had comprehensive soil conservation programs in effect on their farms for 3 years, many of them for 5 years and some of them for 8 years.

The average results reported by these farmers therefore, are not lucky yields

obtained in just one good year on outstanding farms. They are fair examples of what other farmers can expect if they give soil conservation and good land use practices a change to work for them.

A summary of their answers is shown in the chart below:

Average Crop Increases from Soil Conservation on 350 Farms			
Crop	Yield	Yield	Per Cent Increase
	per Acre Before Soil Conservation	per Acre After Soil Conservation	
CORN	44.3 bushels	57.2 bushels	29
OATS	33.6 bushels	40.3 bushels	20
WHEAT	20.9 bushels	24.1 bushels	15
POTATOES	257.6 bushels	302.7 bushels	18
TOMATOES	6.5 tons	8.3 tons	28
HAY	1.5 tons	1.9 tons	27

Results from other surveys made by the Soil Conservation Service are just as impressive. If you are not now using a systematic plan of soil conservation, it is obvious that you can profit handsomely by doing so. Ask your local soil conservation representative, your soil conservation district supervisor or director (if you live in a district) or your county agent to help you begin.

Use of Sudan grass in conservation program made a crop yield between 8 and 10 tons to acre on previously abandoned farm.





Pictorial proof that livestock finds kudzu feeding a pleasant occupation. Kudzu has a feeding value as high as that of alfalfa.

KUDZU as a farm crop

There's not much argument about kudzu's being an effective erosion-control crop. But how can you get any use out of it? Where is the more immediate payoff?

There's an answer. Kudzu makes hay of excellent quality, with a feeding value as high as that of alfalfa. And here is a plant that produces larger yields than most annual plants that are commonly grown and boasts the added advantage of not being so seriously affected by seasonal droughts as are most of the annuals.

Moreover, Kudzu can be relied upon to give a fair yield of hay every year, whereas the annuals often fail because of periods of unfavorable weather during the growing season. After it has achieved sufficient growth, kudzu makes hay of good quality if cut at any time from early summer until late fall before the leaves are killed by frost. Certainly this long period over which hay may be harvested without serious deterioration in quality is one of kudzu's chief assets.

Don't Mow Too Often

Considerable caution is necessary when mowing kudzu for hay to avoid injury to the stand. The new growth that immediately follows removal of the tops draws heavily on the starchy material in the fleshy roots. Too frequent mowing exhausts the stored material in the roots and reduces vitality of the plants. One cutting in June or July, at the convenience of the farmer, can be made safely. If two cuttings are made, it is best to make one early in the summer and the second late in the fall just before the average date of the first killing

frost. When kudzu is mowed several times during a season, it is wise to abandon cutting the following year to allow the plants to restore starch in the roots.

Kudzu ordinarily demands three or more years to establish a stand, and observations indicate that mowing should not be attempted before the third season even though enough growth is registered the second season for harvesting a crop of hay.

One decided advantage of this viny plant when cut for hay is the thick layer of organic material left on the surface of the soil after the hay is removed. This is the layer of material that provides adequate protection against erosion during the winter months.

A common question arising about kudzu is: How can it be raked?

An ordinary dumprake turns the trick. Some farmers take hay from the swath with pitchforks to avoid breaking vines and injuring the stand of plants. Where cultivation is given during the first two growing seasons to establish a thick stand of plants, the stand is not materially injured by raking.

Kudzu Cures Rapidly

Kudzu hay cures rapidly. It may be stored in the barn the day after it is mowed, if the weather is clear.

As a grazing plant kudzu is valuable, particularly on upland soils that are too dry and too low in fertility to support a satisfactory sod of pasture grasses. On hill land adjacent to permanent pastures, it provides grazing when permanent pastures fail and fills a definite place in a well-rounded grazing program.

Kudzu really fills the bill—for hay and for grazing. And don't forget the long-term advantages of combatting erosion. It's hard to spell and hard to pronounce, but kudzu will save that precious topsoil for you.

Like Riding on a Cloud

The Cities Service **AIRMASTER** brings you an entirely new kind of ride . . . It seems to make your car float over the bumps and rough spots. You ride on more air at less air pressure. That means smoother riding. The narrower, flatter tread grips the road more surely and safely. Also, you can equip your car with these great new low-pressure **AIRMASTERS** without changing your present wheels and rims. Try them, the results are phenomenal.



For the Softest, Smoothest, Safest Driving You've Ever Had

CITIES  SERVICE

AIRMASTER TIRES

PLANT NUTRIENT CHART

	When Correctly Balanced	When Too Much or Unbalanced	When Not Enough
NITROGEN	Increases growth. Increases bloom. Foliage dark green. Increases total yields.	Sappy growth. Tendency to lodge. Susceptible to disease. May not set fruit. Plants may suffer in times of short water. Poor quality of fruit, sappy.	Foliage pale green. Stunted growth.
PHOSPHATES	Accelerates fruitings. Encourages root action. Strengthens the stem. Gives sounder fruit. Reduces tendency to disease. Makes for more nutritious plants. Gives body and stability in bloom. Hastens maturity.		Where phosphates are deficient, it is rather difficult to recog- nize the symptoms until it is too late. The fruit does not set, the stems have a purplish cast, and the grain is scanty.
POTASH	Increases sugar and starch. Increases root system. Improves bloom. Gives sounder fruit. Gives more weight to grain. Reduces tendency to diseases.	Delays maturity.	The edges of the leaves become brown without withering in the early stages. Grasses, corn, wheat, oats, sudan and other long leafed plants will show brown tongues shooting from the base to the tips of the leaves. Legumes will show white spots on the under side of the leaves.
IRON			Leaves pale with the veins dark green.



Homemaking

CORRECT CURING AND STORING OF THE HOME MEAT SUPPLY

Home butchering plays an important part in the farm budget these days of high meat prices. Proper curing, smoking and storing are necessary to insure success with home butchering.

Fresh meat should be chilled promptly after slaughter to 36 to 40 degrees Fahrenheit and kept at this temperature during the curing process.

The following amounts of curing ingredients are recommended for each 100 pounds of meat in dry cure: seven pounds of salt, two pounds of sugar and two ounces of saltpeter. The salt preserves and dries the meat. Too much will impair the flavor and make the lean muscles undesirably hard. Brown or cane sugar counteracts the harshness of the straight salt cure and improves flavor and texture of the meat. Saltpeter preserves and dries the meat but is used almost entirely to fix the bright red color of the lean meat.

How To Figure Curing Time

Figure the curing time as follows: Two and one-half to three days per pound per piece for hams and shoulders and two days per pound per piece for bacons. Rub one-half the curing mixture on all surfaces of the meat, using a heavier layer on the thicker cuts. Pack the cuts in a clean wooden barrel or crock. Be careful not to shake off the curing mixture. After six to eight days, take the meat out of the cure and resalt the hams and shoulders with the remainder of the curing mixture.

For brine cure use the same amount of ingredients for the curing mixture and mix with four gallons of water for each 100 pounds of meat. Pack the fresh cuts in a clean barrel or crock and cover with the brine. Then place a weight on

top to keep the meat from floating.

In making the brine, boiling water that has been cooled should be used to avoid contamination. The meat in the brine solution should be overhauled three times at weekly intervals. When overhauling, turn the cuts over and reverse their position from top to bottom of the barrel or crock.

After curing, the meat should be washed with warm water and soaked for an hour in cool water and hung in the smokehouse to drain for 24 hours before smoking.

Don't Use Resinous Wood

For smoking use any green hardwood. If timber is scarce, corncobs may be used. Don't use resinous wood. It will blacken the meat and give it an undesirable flavor. The meat should be hung six to eight feet from the fire. Hang it so that no two pieces touch. Smoke for about 36 hours with a slow, smoldering fire. If your fire gets too hot, green sawdust may be used to deaden the blaze.

In storing, the pieces of meat should be wrapped in grease resistant paper before being placed in a protective outer bag. The bags can then be hung in a dark, cool, dry, rat-free place until ready to use. Do not hang the wrapped meat by the string that passes through the meat as insects may enter the package along the string. Fold over the tops of the bags and tie them securely, making a loop for hanging the meat in the outside tie string.

REMOVE GREASE SPOTS WITHOUT TELLTALE RINGS

Grease spots and stains disappear like magic from clothing, upholstery and other fabrics when you go after them with Cities Service Spot Remover. Non-explosive. Leaves no telltale rings. Comes in the handy "brush-top" bottle. . . . easy to apply.

CITIES  SERVICE
BRUSH TOP
SPOT REMOVER



HOME STORAGE of
VEGETABLES and FRUITS

And how does *your* garden grow?
Chances are that a garden of only a half-acre, if cared for properly, will produce more vegetables than your family can consume during the maturing period of the crops. But if you're smart, the surplus can grace your table all winter long.

Crops of suitable sorts that mature at a season when they can be preserved by storing should be kept in their natural condition instead of being canned or dried. Of course, such perishables as peaches, tomatoes, peppers, eggplants and melons have to be eaten or canned. But late cabbage, celery, onions, potatoes, parsnips, turnips and other root crops may be stored in their natural con-

CITIES SERVICE
GLASS CLEANER



Windows, mirrors, glass shelf and table tops sparkle and gleam when you use Cities Service Glass Cleaner. Simply wipe it on ... wipe it off. It's quick and easy to use. Keep a bottle handy and lighten housework. Costs but a few cents.

SAVES TIME AND WORK

dition and should be grown to the extent of the family needs for winter usage. The advantages of planning a menu while ignoring market conditions and winter temperatures—because there is a supply of fresh produce in the storage room downstairs—cannot be measured in dollars and cents.

PLACES RECOMMENDED FOR HOME STORAGE OF VEGETABLES AND FRUITS

COMMODITY	PLACE TO STORE
Vegetables:	
Dry beans and peas.....	Attic or other cool, dry place.
Late cabbage.....	Pit, trench, or outdoor cellar.
Late celery.....	Pit or trench; roots in soil in storage cellar.
Endive.....	Roots in soil in storage cellar.
Onions.....	Any cool dry place, above freezing.
Parsnips.....	Where they grew, or in soil in storage cellar.
Various root crops.....	Pit or in soil in storage cellar.
Potatoes.....	Pit or storage cellar.
Pumpkins and squashes.....	Moderately dry, fairly cool cellar or basement.
Sweet potatoes.....	Moderately dry, warm cellar or basement.
Fruits:	
Apples.....	Storage cellar, pit, or basement.
Pears.....	Storage cellar.
Grapes.....	Basement or storage cellar.
Plums.....	Basement or storage cellar.

LENGTH OF STORAGE PERIOD AND RECOMMENDED TEMPERATURE AND HUMIDITY
FOR HOME STORAGE OF VEGETABLES AND FRUITS

COMMODITY	LENGTH OF STORAGE PERIOD	TEMPERATURE	HUMIDITY
Vegetables:			
Dry beans and peas.....	As long as desired.....	Cool.....	Dry.
Late cabbage.....	Through late fall and winter.....	Cool; avoid severe freezing.....	Moderately moist.
Cauliflower and broccoli.....	2 to 3 weeks.....	32° F.....	Moderately moist.
Late celery.....	Through late fall and winter.....	Cool; avoid freezing.....	Moist.
Endive.....	2 to 3 months.....	Cool.....	Moist.
Onions.....	Through fall and winter.....	Cool.....	Dry.
Parsnips.....	Through fall and winter.....	Cool; freezing doesn't injure.....	Moderately moist.
Various root crops.....	Through fall and winter.....	Cool; avoid freezing.....	Moderately moist.
Potatoes.....	Through fall and winter.....	Avoid freezing.....	Moderately moist.
Pumpkins and squashes.....	Through fall and winter.....	50° to 60° F.....	Moderately dry.
Sweet potatoes.....	Through fall and winter.....	55° to 60° F.....	Moderately dry.
Fruits:			
Apples and pears.....		Cool.....	Moderately moist.
Grapes.....	1 to 2 months.....	Cool.....	Moderately moist.
Plums.....	4 to 6 weeks.....	Cool.....	Moderately moist.

HOME HINTS

Reprinted from Cities Service Master Farmer

For easier and more even planting of vegetables and flowers, use a salt shaker for the small seeds.

—*Mary E. Riddle, Piedmont, S. C.*

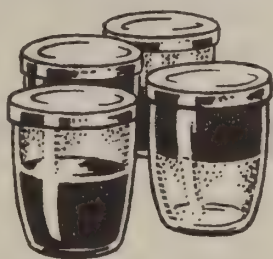


When in a hurry to iron an article that hasn't been sprinkled, wet a turkish towel in hot water, wring and roll the article to be ironed in it. In a few seconds it will be ready to iron.

—*Mrs. Geo. Acker, Coleman, Mich.*



At jelly making time, fill the glasses half full of one kind of jelly and let harden. Then finish filling glasses with another color of jelly. This gives variety and is nice for serving when company comes.



—*Mrs. Don Dillon, Paxton, Ill.*



Protect the prescription number and directions for administering it on a box or bottle of medicine with scotch tape. Just put the tape over the label and you will have all the information necessary in case you need a refill.

—*Mrs. M. H. Lang, E. Rockaway, N. Y.*



To mend that ripped or torn place in lace curtains, simply place a piece of paper under the hole and stitch back and forth on the sewing machine. When the hole is filled pick out the paper. Use very fine thread for stitching and curtains are like new again.

—*Mrs. Oscar Goodman, Correctionville, Ia.*



When varnishing floors, use a soft cloth instead of a brush. It will go on much faster, smoother and will leave no brush marks. Just don a pair of rubber gloves, dip the cloth in the varnish, squeeze out the surplus and rub on the floor. You will be amazed at the results.

—*Mrs. Jerry Edington, Coleman, Texas*



When there is a painting job to be

done, glue an ordinary paper plate to the bottom of the paint can. This can be moved about with no trouble and saves many a paint splotch on the floor.



—*Christine Shearer, Worcester, Penna.*



Place an electric light of some kind under the bed at night in a sick room. The patient will be in darkness but the light will be on the floor where it is needed by the attendant.

—*Mrs. W. D. Price, Altamont, S. D.*



Make an easy and quick task of sprinkling clothes for ironing. Just fill an ordinary fly or insect sprayer with warm water and spray your clothes. The water goes on much more evenly and you won't splash everything within reach.

—*Doris Michael, Warren, Ohio*



If you are a lover of goldfish, you know they become very playful on rainy days or nights and sometimes flounce out of the bowl. To prevent this, just slip a cap-shaped hair net over the bowl. This lets the air in and the fish cannot get out.

—*Mrs. Clay Miller, New Albany, Miss.*

**CITIES SERVICE
UTILITY OIL**

You'll like this all-purpose Utility Oil for lubricating light machinery and appliances. Use it for your sewing machine, vacuum cleaner and dozens of other uses. Keep a can handy . . . helps save repair bills. Just a few drops do the trick.

**SAVES REPAIR BILLS
ON HOME APPLIANCES**



Farm



Modernization

The double factor of scarcity and high cost of hired hands is causing more and more farm families to swing to increased use of "electric muscles" these days. Not only are hundreds of farms being wired for electricity each day but the farmers who have had electricity are constantly finding new ways to put this power to work for them.

John Gibson, dairy farmer of Stuyvesant, N. Y., is one of these. The daily chore of cleaning out his 70-cow barn used to take more than an hour of his time each day. Now he simply flicks a

conditions. The lamps do not heat the entire brooder house, therefore their use permits a natural zone of cool air away from the brooder. By moving from the heated air under the brooder to this cool zone at will, chicks become adapted at an early age to changing temperatures, and thus become more hardy.

A pig brooder, built at home from scrap lumber and warmed by a lamp, can be set up in the corner of your hog pen to keep pigs warm and dry and safe from being rolled on by the sow. College tests prove the value of the pig brooder in cutting losses in each litter.

Herman Schmidt, of O'Brien County, Iowa, has this to say about his home-made electric pig brooder: "I brooded 130 pigs during the middle of March. I had the lamps on continuously for about the first two weeks. After being placed under the lamps the pigs stayed there continually and only came out to suck. Even now when they are three weeks old and the lamps are not on they

"ELECTRIC MUSCLES" FOR THE FARM

switch and within 18 minutes the manure is removed from the gutter by an electrically operated barn cleaner.

Edwin Benhart, of Roselle, Illinois, has found that use of an electric stock-tank de-icer keeps a drink hole open in the ice that forms overnight in his stock tank. Thus, he not only eliminates the need for manually de-icing the tank himself on cold winter mornings, he also keeps up milk production of his herd because the animals always have plenty of water to drink.

An electric chick brooder will save you time and labor. It will save more chicks by reliable heat control, thus preventing feed loss. A lamp-type brooder is a near approach to natural brooding

spend much of their time under the hover. Usually, I expect to lose at least one pig each litter because the sow lies on them. This year not one was smothered by the sow."

There are more than 300 ways in which you can make "electric muscles" work for you. You are limited only by your own ingenuity. The Rural Electrification Administration has free publications which you can obtain by writing to that bureau, U. S. Department of Agriculture, St. Louis 2, Missouri. Your local utility company and county agent can also supply you with helpful information on electrical time and work savers that will lighten the load of your daily chores.

EVER-FRESH FROZEN FOOD CABINET



Now you can have out-of-season delicacies all year long . . . and save in three ways at the same time. With an Ever-Fresh Frozen Food Cabinet you can buy in larger quantities at lower prices . . . you will waste less food because you can quickly process surplus for use months later . . . and you eliminate canning expense almost entirely.

Ask your Cities Service representative about these attractive frozen food cabinets. You'll be surprised at their reasonable cost—and there's a size that will fit your exact need.

LP-GAS Increases Comfort and Convenience of Rural Living

Twenty years ago, certain gases in petroleum were a waste by-product of the petroleum industry. They were lost when natural gasoline was "weathered" to reduce its volatility before shipment in tank cars. Today, these substances are used to make liquefied petroleum (LP) gas (sometimes called "tank gas" or "bottled gas"). This fuel is now used for industrial and domestic purposes to such an extent that an estimated 1½ billion gallons were produced in 1946.

Since 1940, domestic uses have accounted for the greatest portion of the marketed production of LP-gas. Today it is estimated that 53 per cent is consumed for domestic purposes.

Service Rather than Commodity

The 4,000,000 families using LP-Gas (the majority of these are rural families) think of it as a service rather than a commodity. To them, gas comes with a turn of a valve to cook, heat, refrigerate and they know as little of the mechanics of installation as the city housewife knows of the intricate system of pipes extending through her city to her home, from the far away oil fields.

To rural families LP-Gas represents the comfort and convenience of urban living. It can be used for cooking, refrigerators, water heaters, space heaters, furnaces, washing machines, air conditioning apparatus or as a fuel for any other type of gas appliance. Most gas appliance manufacturers are now bringing out lines of appliances especially designed to operate on this type of fuel.

Helps Lighten Daily Chores

But LP-Gas is not alone limited to aiding the housewife. Mr. Farmer, too, can lighten his daily chores with this modern fuel. It can be used for heating stock watering tanks and fountains, for incubators or brooders, for the pasteurization of milk, or for sterilizing milk utensils and other equipment.

Fruit farmers can use LP-Gas in dehydrating fruits and vegetables, to prevent frost damage, or in heaters in ripening rooms. It can be used for smoking meat. Poultry farmers use it for

Save Time . . . Save Work with CITIES SERVICE PENETRATING OIL

Save your temper, your knuckles and valuable time by keeping a supply of Cities Service Penetrating Oil on hand. It's remarkably effective for loosening gummed bearings, rust-frozen bolts and nuts and all other rusted-in connections.

It works in fast and cuts the rust. You will hardly believe how effective it is until you have tried it. A little goes a long way, too.



scalding and waxing. A more recent use of LP-Gas is in flame cultivation to control weeds or for thinning.

Five Major Advantages

LP-Gas has five major advantages as a fuel for farm families:

(1) It is moderate in cost. A general average of costs, taken throughout the United States, reveals that it is one of the most economical of all modern fuels.

(2) LP-Gas is obtainable in all sections of the country. Few homes in the United States are more than a mile from established routes of dependable dealers who give good service.

(3) LP-Gas is dependable. Storms, no matter how long they last or how severe they may be, do not interfere with the service of LP-Gas. The gas is uniform in formula at all times.

(4) LP-Gas is a convenient fuel. Under modern installation the dealer makes regular calls, filling the gas containers, long before they are emptied, as part of his regular service.

(5) Gas is the most efficient of the modern fuels. LP-Gas, because of its high BTU content, is the most efficient of all gases. It is flexible, fast and clean. The visible flame is easily controlled.

The demand for LP-Gas at the moment exceeds the supply. Your Cities Service representative can tell about the advantages of LP-Gas and whether it is available in your area. If you desire further information about this product, ask him and he'll be glad to assist you.

Ready
Reference
Section



WEIGHTS and MEASURES

LONG MEASURE

12 Inches	1 Foot
3 Feet	1 Yard
5 1/2 Yards	1 Rod
320 Rods	1 Mile
1 Mile	5280 Feet

The following also are used:

1 Hand	4 Inches
<i>(Used in measuring the height of horses)</i>	
1 Fathom	6 Feet
<i>(Used in measuring depths at sea)</i>	
1 Nautical Mile	1.15 Land Miles
<i>(Used in measuring distances at sea)</i>	

SQUARE MEASURE

144 Square Inches	1 Square Foot
9 Square Feet	1 Square Yard
30 1/4 Square Yards	1 Square Rod
160 Square Rods	1 Acre
640 Acres	1 Square Mile

An acre is equal to a square whose side is 208.71 feet.

SURVEYOR'S SQUARE MEASURE

10,000 Square Links	1 Square Chain
10 Square Chains	1 Acre
10 Chains Square	10 Acres

SURVEYOR'S LINEAR MEASURE

7.92 Inches	1 Link
100 Links	1 Chain
80 Chains	1 Mile

Gunter's Chain is the unit and is 66 feet long.

LAND MEASURE

To find the number of acres in a body of land, multiply the length by the width (in rods) and divide the product by 160. When the opposite sides are unequal, add them and take half of the sum for the main length or width.

An acre contains 4,840 square yards or 43,560 square feet. A square acre measures 208.71 feet on each side.

CIRCLES AND GLOBES

To find the circumference of a circle multiply the diameter by 3.1416.

To find the area of a circle multiply the square of the diameter by .7854.

To find the surface of a globe, multiply the square of the diameter by 3.1416.

To find the volume of a globe, multiply the cube of the diameter by 5.236.

LIQUID MEASURE

4 Gills	1 Pint
2 Pints	1 Quart
4 Quarts	1 Gallon
1 Gallon contains 231 Cubic Inches.	
1 Cubic foot equals 7 1/2 Gallons.	

DRY MEASURE

2 Pints	1 Quart
8 Quarts	1 Peck
4 Pecks	1 Bushel
1 Bushel contains 2150.42 cubic inches or approximately 1 1/4 cubic feet.	

CUBIC MEASURE

1728 Cubic Inches	1 Cubic Foot
27 Cubic Feet	1 Cubic Yard
144 Cubic Inches	1 Board Foot
128 Cubic Feet	1 Cord

NUMBER OF POUNDS TO THE BUSHEL*

Alfalfa	60	Corn (Pop) (In Ear)	70	Millet, Hungarian	48
Apples (Green)	48	Corn (Kafir)	56	Oats	32
Apples (Dried)	24	Corn Meal	50	Onions	57
Barley	48	Coal, Hard	80	Orchard Grass	14
Beans (White)	60	Coal, Charcoal	20	Peaches (Dried)	33
Beans (Castor)	46	Coke	40	Peas	60
Beans (Soy)	60	Flax Seed	56	Potatoes	60
Bran	20	Cranberries	32	Potatoes (Sweet)	50
Buckwheat	48	Grapes	40	Red Top Seed	14
Blue-Grass Seed	14	Hair (Plastering)	8	Rye	56
Cherries	40	Hemp Seed	44	Timothy Seed	45
Clover Seed	60	Kafir Corn	56	Tomatoes	50
Clover (Sweet)	60	Lime	80	Turnips	55
Corn (Shelled)	56	Malt	38	Wheat	60
Corn (In Ear)	70	Millet Seed, Common	50		

*Approximate. Legal weights may vary in different states.

GESTATION PERIODS of Farm Animals and Pets

Animal	Approx. Days
Cow.....	283
Mare.....	340
Sow.....	112
Ewe.....	150
Dog.....	63
Cat.....	56-63
Rabbits.....	31-32

INCUBATION PERIODS

Kind of Poultry	Days
Chicken.....	21
Pheasant.....	22-24
Duck.....	28
Duck (Muscovy) ..	33-35
Turkey.....	28
Peafowl.....	28
Guinea Fowl.....	26-28
Ostrich.....	42
Goose.....	30
Pigeon.....	17

HANDY CHART FOR BREEDING RECORDS

Service Date	EXPECTED DATE OF BIRTH			
	Mare	Cow	Ewe	Sow
Jan. 1	Dec. 17	Oct. 11	May 31	Apr. 25
Jan. 11	Dec. 17	Oct. 21	June 10	May 5
Jan. 21	Dec. 27	Oct. 31	June 20	May 15
Jan. 31	Jan. 6	Nov. 10	June 30	May 25
Feb. 10	Jan. 16	Nov. 20	July 10	June 4
Feb. 20	Jan. 26	Nov. 30	July 20	June 14
Mar. 2	Feb. 5	Dec. 10	July 30	June 24
Mar. 12	Feb. 15	Dec. 20	Aug. 9	July 4
Mar. 22	Feb. 25	Dec. 30	Aug. 19	July 14
Apr. 1	Mar. 7	Jan. 9	Aug. 29	July 24
Apr. 11	Mar. 17	Jan. 19	Sept. 8	Aug. 3
Apr. 21	Mar. 27	Jan. 29	Sept. 18	Aug. 13
May 1	Apr. 6	Feb. 8	Sept. 28	Aug. 23
May 11	Apr. 16	Feb. 18	Oct. 8	Sept. 2
May 21	Apr. 26	Feb. 28	Oct. 18	Sept. 12
May 31	May 6	Mar. 10	Oct. 28	Sept. 22
June 10	May 16	Mar. 20	Nov. 7	Oct. 2
June 20	May 26	Mar. 30	Nov. 17	Oct. 12
June 30	June 5	Apr. 9	Nov. 27	Oct. 22
July 10	June 15	Apr. 19	Dec. 7	Nov. 1
July 20	June 25	Apr. 29	Dec. 17	Nov. 11
July 30	July 5	May 9	Dec. 27	Nov. 21
Aug. 9	July 15	May 19	Jan. 6	Dec. 1
Aug. 19	July 25	May 29	Jan. 16	Dec. 11
Aug. 29	Aug. 4	June 8	Jan. 26	Dec. 21
Sept. 8	Aug. 14	June 18	Feb. 5	Dec. 31
Sept. 18	Aug. 24	June 28	Feb. 15	Jan. 10
Sept. 28	Sept. 3	July 8	Feb. 25	Jan. 20
Oct. 8	Sept. 13	July 18	Mar. 7	Jan. 30
Oct. 18	Sept. 23	July 28	Mar. 17	Feb. 9
Oct. 28	Oct. 3	Aug. 7	Mar. 27	Feb. 19
Nov. 7	Oct. 13	Aug. 17	Apr. 6	Mar. 1
Nov. 17	Oct. 23	Aug. 27	Apr. 16	Mar. 11
Nov. 27	Nov. 2	Sept. 6	Apr. 26	Mar. 21
Dec. 7	Nov. 12	Sept. 16	May 6	Mar. 31
Dec. 17	Nov. 22	Sept. 26	May 16	Apr. 10
Dec. 27	Dec. 2	Oct. 6	May 26	Apr. 20

SOURCES OF INFORMATION ON MANY SUBJECTS

In most instances, the most convenient source of information regarding farm problems is your county agent's office. For information on other subjects, your local library or your local newspaper probably will be glad to help you. Other sources of information you may require from time to time are listed below.

BULLETINS—AGRICULTURAL—Your State Agricultural College; or Superintendent of Documents, Government Printing Office, Washington 25, D. C.

MINERALS (Identification of Samples)—Bureau of Mines, Department of the Interior, Washington 25, D. C.

CROP INSURANCE—Federal Crop Insurance Corp., Washington 25, D. C.

CHEMURGY—National Farm Chemurgic Council, 50 West Broad Tower, Columbus 15, Ohio.

GEOGRAPHY—National Geographic Society, Washington 6, D. C.

GOVERNMENT EMPLOYMENT—Civil Service Commission, 8th and F Streets, N. W., Washington 25, D. C.

FIRE AND LIGHTNING PROTECTION—National Fire Protection Association, 60 Battery-march Street, Boston 10, Mass.

LOANS—Farm Credit Administration, Washington 25, D. C., or nearest Regional Office.

LUBRICATION PROBLEMS—Your local Cities Service representative.

MAPS (Topographical and Detail)—U. S. Geodetic Survey, 14th St., Washington 25, D. C.

SOCIAL SECURITY—Social Security Board, 1825 H Street, N. W., Washington 25, D. C., or your regional board.

SOIL EROSION CONTROL—Soil Conservation Service, Dept. of Agriculture, Washington 25, D. C., or your Soil Conservation District.

FISH, BIRDS AND WILDLIFE—Fish and Wildlife Service, Department of the Interior, The Merchandise Mart, 222 N. Bank Drive, Chicago 54, Ill.

INCOME TAX—Your nearest Collector of Internal Revenue.

SUBSIDIES — AGRICULTURAL—Your local AAA County office.

TIRES AND TUBES—Your local Cities Service representative.

VETERANS' RIGHTS—Veterans Administration, Vermont Ave., between H and I Street, N. W., Washington 25, D. C.

CAPACITIES OF ROUND TANKS, BINS and SILOS

The best way to estimate the capacity of silos, cylindrical bins, tanks, or corneribs is first to obtain the cubic feet of inside space. This is done by multiplying first, square of the diameter by .7854. This gives you the area of the bottom in square feet. Next multiply this area by the height, in feet. This gives you the cubic feet capacity.

Having found the cubic feet, you can measure its capacity as follows:

FOR SILAGE.....Divide the cubic feet by 57. The result is tons of silage.

FOR GRAINS.....Multiply the cubic feet by 8 to get the number of bushels.

FOR LIQUIDS.....Multiply the cubic feet by 7.47 to get the number of gallons.

The handy chart below gives you the cubic feet of content in cylinders from 5 to 20 feet in diameter and one to 20 feet in height.

TO FIND THE CAPACITIES OF ROUND TANKS AND SILOS																		
Chart shows capacities in cubic feet of silos, round tanks and round bins																		
DEPTH IN FEET																		
Diam in Ft.	One	5	5½	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
5	19.6	98	108	118	137	157	177	196	216	235	255	275	294	314	334	353	373	393
5½	23.8	119	131	143	166	190	214	238	261	275	309	333	356	380	404	428	451	475
6	28.3	141	156	170	198	226	255	283	311	339	368	396	424	452	481	509	537	565
6½	33.2	166	183	199	232	165	299	332	365	398	431	465	498	531	564	597	630	664
7	38.5	192	212	231	269	308	346	385	423	462	500	539	577	616	654	693	731	770
7½	44.2	221	243	265	309	353	398	442	486	530	574	618	663	707	751	795	839	884
8	50.3	251	276	302	352	402	452	503	553	603	653	704	754	804	855	905	955	1005
9	63.6	318	350	382	445	509	573	636	700	763	827	891	954	1018	1081	1145	1209	1272
10	78.5	393	432	471	550	628	707	785	864	942	1021	1099	1178	1257	1335	1414	1492	1571
11	95.0	475	523	570	665	760	855	950	1045	1140	1235	1330	1425	1521	1616	1711	1806	1901
12	113.1	565	622	679	792	905	1018	1131	1244	1357	1470	1583	1696	1810	1923	2036	2149	2262
13	132.7	664	730	796	929	1062	1195	1327	1460	1593	1726	1858	1991	2124	2256	2389	2522	2655
14	153.9	770	847	924	1078	1232	1385	1539	1693	1847	2001	2155	2309	2463	2617	2771	2925	3079
15	176.7	884	972	1060	1237	1414	1590	1767	1944	2121	2297	2474	2651	2827	3005	3181	3353	3534
16	201.1	1005	1106	1206	1407	1608	1810	2011	2212	2413	2614	2815	3016	3217	3418	3619	3820	4021
17	227.0	1135	1248	1362	1589	1816	2043	2270	2497	2724	2951	3178	3405	3632	3859	4086	4313	4540
18	254.5	1272	1400	1527	1781	2036	2290	2545	2799	3054	3308	3563	3817	4072	4326	4580	4835	5089
19	283.5	1418	1559	1701	1985	2268	2552	2835	3119	3402	3686	3969	4253	4536	4820	5104	5387	5671
20	314.2	1571	1728	1885	2199	2513	2827	3142	3456	3770	4084	4398	4712	5027	5341	5655	5969	6283

HOW TO ESTIMATE QUANTITIES OF HAY, GRAIN, ETC.

TONS OF HAY IN A STACK

Figure the overthrow (the distance from the ground on one side, over the stack, and to the ground on the other side.) Multiply the overthrow by the length by the width, all in feet, multiply by 3, divide by 10, and then divide by 500 if hay is well settled, 600 if not.

TONS OF HAY IN A MOW

Quantity of hay in a mow can be only approximately ascertained by measurement since weight will depend on how thoroughly the hay is settled. Good timothy hay will take about 350 cubic feet per ton when thoroughly settled. New hay will occupy 500 cubic feet and more. Estimate how thoroughly hay is settled, then determine cubic feet of mow and divide by 350 or 500.

BUSHELS OF GRAIN IN BIN

To find the number of bushels of grain or shelled corn in a bin or wagon box, multiply the length, by the width, by the average depth of the grain, all in feet. Multiply this result by .8. The result is approximate bushels.

BUSHELS OF CORN IN CRIB

Multiply length of crib, by width, by average depth of corn. This gives cubic feet. For heavy grain, small cob corn, divide by 2. For medium grain, medium cob, divide by 2¼ (two and one-quarter), ½ for light grain, medium cob, by 2¾. The result is bushels of shelled corn.

CORDS OF WOOD IN A PILE

Multiply the length by the height, by the width, all in feet. Divide the product by 128.

BUILDING COMPUTATIONS

WEIGHTS OF STRUCTURAL MATERIALS PER CUBIC FOOT

Common brick.....	125	Hemlock.....	28
Cement.....	94	Lime.....	53
Coal (soft lump).....	54	Limestone.....	164
Concrete.....	150	Oak, red.....	44
Cypress.....	29	Oak, white.....	47
Douglas Fir.....	30	Pine, yellow.....	36
Earth (rammed).....	100	Sand.....	100
Gravel.....	120	Water.....	62.4

SQUARE FEET OF BOARDS

To find contents of boards in square feet, multiply the length, in feet, by the width, in inches and divide the product by 12. Example: — Find contents of a 16-foot board, 9 inches wide. $9 \times 16 = 144$ divided by $12 = 12$ square feet.

SHINGLES REQUIRED IN A ROOF

Double the rafters and multiply by the length of the building. Multiply by 9 if exposed 4 inches to the weather, or by 8 if exposed $4\frac{1}{2}$ inches to the weather, by $7\frac{1}{2}$ if exposed five inches.

Laid five inches to the weather, 1,000 shingles will cover 100 square feet. Laid four inches, 1,000 will cover 80 square feet.

NUMBER OF BOARD FEET IN A LOG

To find the board feet in a log, subtract 4 inches from the diameter and square the remainder. The result will be the number of board feet in a 16-foot log. Add $\frac{1}{8}$ of this amount for an 18 foot log, $\frac{1}{4}$ for a 20-foot log. Subtract $\frac{1}{8}$ for a 14-foot log, and $\frac{1}{4}$ for a 12-foot log.

BRICK FOR CHIMNEY

Five courses of brick will lay one foot in height on a chimney. 6 bricks in a course will lay a flue 9" x 9" inside. 17" x 17" outside; 10 bricks—17" x 17" inside, and 26" x 26" outside; 12 bricks—22" x 22" inside, and 31" x 31" outside.

COMMON NAIL SIZES

Size	Length and Gauge	Approx. No. to Lb.
2d.....	1 inch No. 15.....	876
3d.....	1¼ inch No. 14.....	568
4d.....	1½ inch No. 12½.....	316
5d.....	1¾ inch No. 12½.....	271
6d.....	2 inch No. 11½.....	174
7d.....	2¼ inch No. 11½.....	161
9d.....	2¾ inch No. 10½.....	96
10d.....	3 inch No. 9.....	69
12d.....	3¼ inch No. 9.....	63
16d.....	3½ inch No. 8.....	49
20d.....	4 inch No. 6.....	31
30d.....	4½ inch No. 5.....	24
40d.....	5 inch No. 4.....	18
50d.....	5½ inch No. 3.....	14
60d.....	6 inch No. 2.....	11

PAINT REQUIRED FOR A GIVEN SURFACE

The amount varies with the thickness and kind of paint, the age of the surface, etc. An approximate rule: Divide the number of square feet of surface by 200. The result will be the number of gallons of liquid paint required to give two coats; or divide by 18 and the result will be the number of pounds of pure ground white lead required for three coats.



CITIES SERVICE Electric Motor Oil

A few drops of Cities Service Electric Motor Oil will do an efficient lubrication job for you. This wax-free mineral oil is free flowing—has a pleasant odor. It has non-gumming, anti-rust properties that will help keep your electric motors, appliances, lawn mowers and other similar articles in tip-top running condition.

For electric motors, lawn mowers,
bicycles, household appliances



Safety on the Farm

PLAY SAFE—ALWAYS USE POWER SHAFT SHIELDS

by C. L. HAMILTON

Agricultural Engineer, National Safety Council

Picture yourself caught in the whirling power take-off drive from your tractor with nobody around to shut off the power. It could happen if you were to slip or fall against the power shaft when the shield is removed. It could happen when you are in a hurry and step over or near the exposed shaft—without intending to be the least bit careless. If your clothing merely flops against a revolving shaft or coupling, you can be drawn in without warning.

But you need not be hurt. Farm machinery manufacturers furnish convenient shielding for power drive shafts. All you have to do is keep it in place. Farmers who fail to use shields simply gamble with death. The stakes are high, and when you lose it is too late to mend your ways. Always keep the odds in your favor by using safety shields.

The Farmers' Responsibility

Farmers who do not have the correct hitches or shields should consult their local implement dealer. Hitches and adapter packages for power-driven implements may be obtained from dealers representing the manufacturer of the implement.

The best shield that can be made



RIGHT



WRONG

gives no protection if it is not used. An operator who fails to use safety shields provided for power-driven shafts is responsible for any injuries or deaths that occur. There is no adequate excuse for not keeping shields in place. It is much easier to be safe than sorry.

Safety is usually neglected in the development of homemade power-driven attachments for tractors. Shielding this type of equipment for safety is a special problem that each user must solve individually. Remember always: No piece of farm machinery is complete until adequate shielding of all power drives is provided.

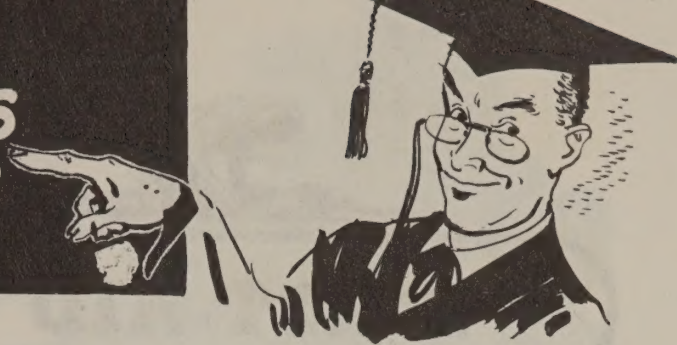
HOW MUCH GASOLINE ARE YOU WASTING?

We can tell you in 30 seconds exactly how much gasoline your engine is wasting. With the Cities Service Power Prover it's as easy as reading a thermometer. This precision instrument shows the efficiency of the combustion process in your engine by analyzing the exhaust gases. A few minor adjustments plus a cleaning may bring your engine back to top operating efficiency. Ask your dealer for a Power Prover test.

CITIES SERVICE POWER PROVER



What's your Score on this SAFE FARM TEST?



Let's face the facts! Agriculture has *more* accidental work deaths than any other major industries; *more* motor vehicle accident fatalities than any other type; *more* farm home than other on-farm accidental deaths. If *you* have any "no's" checked below, play safe—*immediately* eliminate the safety hazards, so you can check "yes" to *all* questions!

MACHINERY AND EQUIPMENT

	YES	NO
Do you keep guards in place on power shafts, belts and chains to prevent being caught in them?...	☐	☐
Do you block machinery and turn off the power before adjusting or unclogging it?	☐	☐
Do you avoid climbing over or around a running combine or thresher? ...	☐	☐
Do you avoid getting in front of the mowing machine to make adjustments while the machine is in gear?	☐	☐
Do you avoid stepping over or under moving belts?	☐	☐
Do you avoid wearing loose-fitting, torn clothing or torn, ragged gloves around moving machinery?	☐	☐

BUILDINGS AND FARMYARD

Are ladders and steps well built and kept in good repair?	☐	☐
Are ladder openings and stairways hand-railed; are hay-chute openings properly protected?	☐	☐
Do you protect water tanks, cisterns, wells or pools, hazardous to the lives of children?	☐	☐
Do you keep the farmyard clear of garden tools, forks, rubbish, waste, etc.?	☐	☐

FIRES

Do you have an emergency water supply available? (Pond, barrels in buildings, or hose attachment to water system?)	☐	☐
Have you eliminated weeds, brush, old lumber, and other similar fire hazards from around buildings?	☐	☐
Do you have chimneys and stovepipes inspected and cleaned regularly? ...	☐	☐

Have you approved type of fire extinguishers at building entrances and are they checked at regular intervals?	YES	NO
	☐	☐

In the absence of an organized rural fire department, do you have definite arrangements with neighbors to come with tools, water, and ladders in case of fire?	☐	☐
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ANIMALS

Are you careful not to surprise animals when approaching them?	☐	☐
Have cattle been dehorned and boars' tusks cut short?	☐	☐
Are small children kept away from pens and barns?	☐	☐
Do you use special care in handling animals with new-born young?	☐	☐
Do you avoid handling the bull by providing a safe bull pen?	☐	☐

ELECTRICITY

Are all electric circuits equipped with proper-size fuses? (Light circuit fuses should generally not exceed 15 amperes)	☐	☐
Do you cut off current when working on an electrical conductor?	☐	☐
Are all electrical appliances in proper condition; are they being properly operated?	☐	☐
Do you avoid replacing burned-out fuses with coins, wire, or other metal?	☐	☐

FARM HOME

Do your stairs have at least one strong handrail?	☐	☐
Do you keep steps, porches, and stairways in good repair?	☐	☐
Do you immediately mop up spilled grease or water?	☐	☐
Do you use a safe step-ladder instead of a chair?	☐	☐
Are small rugs kept away from head and foot of stairs and from landings?	☐	☐
Do you have electric cords repaired or discarded when they become frayed or worn?	☐	☐
Are matches kept out of the reach of children?	☐	☐
Do you keep medicines which are poisonous in a special cabinet with special labels?	☐	☐

ALWAYS BE CAREFUL!



FIRST AID ON THE FARM

(Ed. note. This page on first aid is purposely placed on the last page of this book, so that in times of emergency you can find it quickly).

Every farm family should have a family physician and even the youngest member of the family able to use a telephone should know the doctor's telephone number and how to summon him in case of a serious accident. Many lives have been saved by administering proper first aid measures such as listed below.

SHOCK SIGNS:—The patient is cold and clammy—and one thing to do is keep him warm. Other signs of shock are: Eyes wide open and staring. Face is pale and covered with beads of sweat. Pulse is weak and rapid.

WHAT TO DO: Examine for bleeding. Keep victim lying down and warm with blankets above and below. Keep his head low, loosen his clothing and gently rub his arms and legs toward the body through the blankets. Have him inhale aromatic spirits of ammonia and *don't move unless absolutely necessary*. Give hot tea or coffee when he is able to answer questions. Keep crowds away and call a doctor.

SUNSTROKE—SIGNS: Skin hot and dry. High temperature. Face red. Shooting headache. Delirious.

WHAT TO DO: Remove to shade and undress down to underwear. Sprinkle cold water on face and chest. Use sprinkling can to distribute cold water on underwear or sheet. Use electric fan if available. Put ice on head. Have patient, if conscious, drink lots of cold water—not ice water. *Never* try to give anything to drink to an unconscious patient.

HEAT EXHAUSTION—SIGNS: Skin cold and clammy. Temperature below normal. Face pale. Dull headache. Dizzy feeling. Person may vomit. Pulse weak and rapid.

WHAT TO DO: Call a doctor. Keep warm with blankets above and below. Give salt tablet (15 gr.) or 1 teaspoon salt in pint of water. Give hot coffee. Lay flat on back with head low. Loosen clothing. No alcohol.

BURNS—WHAT TO DO: If burned with a chemical such as an acid or caustic, wash gently with water immediately. Use plenty of water. If possible, use running water from a faucet, hose or shower. Continue to apply water until pain diminishes or until the doctor arrives.

For all other type burns the first thing to do is to keep air away from the burned area by applying water soluble tannic acid jelly or baking soda. Don't apply water or oily or greasy substances which interfere with the later treatment that may be suggested by the doctor.

If a person is burned, he may suffer more from shock than from the burn. If badly shocked, treat for shock first then treat the burns.

POISONS—WHAT TO DO: If a person has swallowed an acid, have him drink a quart or more of soapy water, or lime water, or water with baking soda in it. If he has swallowed a caustic poison (such as lye, caustic soda), have him drink a quart or more of soapy water. If he has swallowed a non-corrosive poison (such as benzol, wood alcohol, arsenic), try to get him to vomit. Put a heaping teaspoonful of salt in a pint of lukewarm water and get him to drink it.

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